



State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Department of Administrative Services

KIMBERLY HOOD
Executive Director

Division of Facilities Construction and Management

F. KEITH STEPAN
Director

ADDENDUM 1

Date: 12-21-2006

To: Contractors

From: Jeff Reddoor, Project Manager,
Burns Arena Study Area Remodel
Dixie State College
DFCM Project. # 06118640

Subject: **Addendum No.1**

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	<u>Specifications</u>	<u>245 Pages</u>
	Total	246 Pages

Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

SCHEDULE HAS NOT BEEN CHANGED

Addendum No. 1

. Specifications have been added per the Architect

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SECTION 03 1113

STRUCTURAL CAST-IN-PLACE CONCRETE FORMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Design, construction, and safety of formwork.
 - 2. Furnish and install required formwork ready for placing of concrete.
 - 3. Strip and dispose of formwork.
- B. Related Sections
 - 1. Section 03 3111: Tolerances for placing normal weight structural concrete.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM D 1751-99, 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).'

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Forms: Wood, metal, or plastic as arranged by Contractor. Forming material shall be compatible with specified form release agents and with finish requirements for concrete to be left exposed or to receive decorative finish.
- B. Form Release Agents:
 - 1. Unexposed Surfaces Only: Contractor's option.
 - 2. Vertical, Exposed Surfaces or Unexposed Surfaces:
 - a. Chemically acting type.
 - b. Type Two Acceptable Products.
 - 1) Crete-Lease 727 or 20-VOC by Cresset Chemical Co, Weston, OH www.cresset.com.
 - 2) Clean Strip (J-1 or J-3 VOC) by Dayton / Richmond Concrete Accessories, Miamisburg, OH www.daytonrichmond.com.
 - 3) E-Z Strip or DEBOND Form Coating by L & M Construction Chemicals, Omaha, NE www.lmcc.com.
 - 4) U S Spec Slickote by U S Mix Products Co www.usspec.com.
 - 5) Duogard or Duogard II by W R Meadows, Elgin, IL www.wrmeadows.com.
 - 6) Equal as approved by Architect before use. See Section 01 6000.
- C. Expansion / Contraction Joints:
 - 1. **1/2 inch** thick.
 - 2. Manufactured commercial fiber type:
 - a. Meet requirements of ASTM D 1751.
 - b. Type Two Acceptable Products:
 - 1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.
 - 2) Sealtight by W R Meadows Inc, Hampshire, IL www.wrmeadows.com.
 - 3) Equal as approved by Architect before installation. See Section 01 6000.
 - 3. Recycled Vinyl:
 - a. Light gray color.

- b. Type Two Acceptable Products:
 - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.com.
 - 2) Equal as approved by Architect before Installation. See Section 01 6000.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Forms:
 - 1. Assemble forms so forms are sufficiently tight to prevent leakage.
 - 2. Properly brace and tie forms.
 - 3. Provide temporary cleanouts at base of tall forms to facilitate cleaning and inspection.
 - 4. Make proper form adjustments before, during, and after concreting.
 - 5. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Provide smooth liner on forms used for concrete to be exposed if necessary to attain specified finish quality.
 - 6. Use metal cold joint forms when unable to place concrete for footings, foundations, and slabs in continuous pours.
 - 7. Provide beveled 2 inch by 4 inch keys where shown on Drawings for tall or heavily loaded walls.
- B. Accessories:
 - 1. Provide for installation of inserts, templates, fastening devices, and other accessories to be set in concrete before placing.
 - 2. Position anchor bolts for hold-down anchors and columns and securely tie in place prior to placing concrete.
- C. Form Release Agents:
 - 1. Film thickness shall be no thicker than as recommended by Manufacturer to attain specified finish. Finish on vertical, exposed concrete shall be of quality equal to CCS-1 or CCS-2 surface as defined by Cresset Chemical.
 - 2. Allow no release agent on reinforcing steel or footings.
- D. Expansion Joints: Install at joints between floor slab and foundation wall where shown on Drawings.
- E. Form Removal: Removal of forms can usually be accomplished in 12 to 24 hours. If temperature is below 50 deg F or if concrete (stairs, beams, etc) depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.

END OF SECTION

SECTION 03 2100
REINFORCING STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install concrete reinforcing steel as described in Contract Documents.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 318-83.
- B. American Society For Testing And Materials:
 - 1. ASTM A 615-04b, 'Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.'

1.3 SUBMITTALS

- A. Quality Assurance / Control:
 - 1. Reinforcing placement drawings.
 - 2. Mill certificates.

1.4 QUALITY ASSURANCE

- A. Certification: Mill tests for reinforcing in accordance with ASTM A 615.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Reinforcing steel shall be free of heavy rust scales and flakes, or other coating at time of delivery and placing. Properly protect rebar on site after delivery.
- B. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Reinforcing Steel:
 - 1. Reinforcing bars shall have grade identification marks and conform to ASTM A 615.
 - a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
 - b. Bars shall be deformed type.
 - c. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.
 - 2. Bars shall be deformed type.
 - 3. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.
- B. Bar Supports:

1. Type Two Acceptable Products:
 - a. Concrete 'dobies' or blocks wired to reinforcing.
 - b. Manufactured chairs with 4 sq in bearing surface with sub-grade, or other feature to prevent chair from being pushed into sub-grade.
 - c. Equals as approved by Architect before installation. See Section 01 6000.

2.2 FABRICATION

- A. Fabricate reinforcing steel according to 'ACI Detailing Manual,' 1988 edition, and details on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Bend bars cold.
- B. Accurately place and support with chairs, bar supports, spacers, or hangers as recommended by 'ACI Detailing Manual,' 1988 edition, except slab on grade work. Support bars in slabs on grade and footings with specified bar supports around perimeter and at 4-1/2 feet 1 350 mm on center each way maximum to maintain specified concrete cover. Install bar supports at bar intersections.
- C. Dowel vertical reinforcement for formed concrete columns or walls out of footing or structure below with rebar of same size and spacing required above.
- D. Securely anchor and tie reinforcing bars and dowels before placing concrete. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Avoid splices of reinforcing bars at points of maximum stress. Lap bars 40 bar diameters minimum unless dimensioned otherwise on Drawings. Run steel reinforcing bars continuous through cold joints.

END OF SECTION

SECTION 03 3053

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Compact sub-base for miscellaneous cast-in-place concrete as described in Contract Documents.
 - 2. Furnish and install granular base for miscellaneous cast-in-place concrete and equipment pads as described in Contract Documents.
 - 3. Furnish and install miscellaneous cast-in-place concrete and equipment pads as described in Contract Documents.
 - 4. Furnish and install sealants as described in Contract Documents.
- B. Related Sections:
 - 1. Section 07 9213: Quality of Sealants.
 - 2. Section 31 2323: Compaction procedures and tolerances.
 - 3. Section 32 8423: Sleeves for underground irrigation system.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM D 1751-99, 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).'

1.3 QUALITY ASSURANCE

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference specified in Section 32 2213.
 - 2. Schedule concrete site element pre-installation conference after installation of sleeves, placing of base, and installation of forms, but before placing of concrete.
- B. Meet quality assurance / control requirements specified in Section 03 3111.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Formwork: Meet requirements specified in Section 03 1113.
- B. Granular Base:
 - 1. Road Base type gravel or crushed rock, graded by weight as follows:

Sieve	Percent Passing	Sieve	Percent Passing
One Inch	100	25 mm	100
3/4 Inch	85 - 100	19 mm	85 - 100
No. 4	45 - 60	5 mm	45 - 60
No. 10	30 - 50	1.2 mm	30 - 50
No. 200	5 - 10 (non-plastic)	0.063 mm	5 - 10 (non-plastic)

- C. Expansion Joints:
 - 1. **1/2 inch 13 mm** thick.
 - 2. Manufactured commercial fiber type:
 - a. Meet requirements of ASTM D 1751.
 - b. Type Two Acceptable Products:
 - 1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.
 - 2) Sealtight by W R Meadows Inc, Hampshire, IL www.wrmeadows.com.
 - 3) Equal as approved by Architect before installation. See Section 01 6000.
 - 3. Recycled Vinyl:
 - a. Light gray color.
 - b. Type Two Acceptable Products:
 - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.com.
 - 2) Equal as approved by Architect before installation. See Section 01 6000.
- D. Concrete: Meet requirements specified in Section 03 3111 for exterior concrete.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Sub-Base: Compact sub-base as specified in Section 32 2213.

3.2 INSTALLATION

- A. Granular Base: Place **4 inches 100 mm** minimum of granular base, level, and compact as specified in Section 32 2213.
- B. Joints:
 - 1. Align joints of sidewalk and curb and gutter.
 - 2. Expansion And Contraction Joints:
 - a. Install so top of expansion joint material is **1/4 inch 6 mm** below finished surface of concrete.
 - b. No expansion joint required between curbs and walks parallel to curb.
 - c. Provide expansion joint at end of walks perpendicular to and terminating at curb.
 - d. Table Two: Spacing On Center:

Sidewalks and Curbs	50 feet	15 000 mm
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 - 3. Scored Control Joints:
 - a. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than **one inch 25 mm**.
 - b. Table Three: Spacing On Center:

Sidewalks	5 feet	1 500 mm
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- C. Finish:
 - 1. Sidewalks And Miscellaneous:
 - a. Broom finish.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
- D. Special Requirements:
 - 1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree.
 - 2. Sidewalks and Landings:
 - a. Slope sidewalks with cross slope of **1/8 to 1/4 inch per ft 3 to 6 mm per 300 mm** in direction of intended drainage.
 - b. Slope sidewalks away from building one percent minimum.
 - c. Do not dust with cement.

3.3 FIELD QUALITY CONTROL

- A. Inspection: To allow Architect's verification of grades and elevations, notify Architect three days minimum before placing concrete for specified concrete site elements.

END OF SECTION

SECTION 03 3111

NORMAL-WEIGHT STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install Project concrete work as described in Contract Documents.
 - 2. Quality of concrete used on Project but furnished under other Sections.
- B. Products Installed But Not Supplied Under This Section:
 - 1. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
 - 2. Concrete accessories.
- C. Related Sections:
 - 1. Sections Under 04 8000 Heading: Bnd bond beams confined in hollow masonry units.
 - 2. Divisions 22, 23, And 26: Mechanical and electrical devices including boxes, conduits, pipes, hangers, inserts, and other work to be embedded in concrete work before placing.
 - 3. Section 31 2324: Granular base course under slabs.
 - 4. Furnishing of items to be embedded in concrete specified in Section involved.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 33-03, 'Standard Specification for Concrete Aggregates.'
 - 2. ASTM C 94-03, 'Standard Specification for Ready-Mixed Concrete.'
 - 3. ASTM C 150-04, 'Standard Specification for Portland Cement.'
 - 4. ASTM C 260-01, 'Standard Specification for Air-Entraining Admixtures for Concrete.'
 - 5. ASTM C 494-04, 'Standard Specification for Chemical Admixtures for Concrete.'
 - 6. ASTM C 618-03, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.'

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Conform to requirements of ASTM C 94 unless specified otherwise.
 - 2. For testing purposes, following concrete strengths are required:
 - a. At 7 days: 60 percent minimum of 28 day strengths.

1.4 SUBMITTALS

- A. Quality Assurance / Control:
 - 1. Concrete mix design.
 - 2. Delivery Tickets: Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
 - a. Name of ready-mix batch plant.
 - b. Serial number of ticket.
 - c. Date and truck number.
 - d. Name of Contractor.
 - e. Name and location of Project.
 - f. Specific class or designation of concrete conforming to that used in Contract Documents.

- g. Amount of concrete.
- h. Time loaded.
- i. Type, name, manufacturer, and amount of admixtures used.
- j. Amount and type of cement.
- k. Total water content.
- l. Sizes and weights of sand and aggregate.

1.5 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. Schedule pre-installation conference after placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs, but before placing of concrete.
 - 2. In addition to agenda items specified in Section 01 3000, review following:
 - a. Approved mix design and use of admixtures.
 - b. Installation scheduling, coordination, and placement of items installed in and under floor slab.
 - c. Placement, finishing, and curing of concrete including cold and hot weather requirements.
 - d. Concrete slab tolerances and corrective measures if tolerances not met.

1.6 PROJECT CONDITIONS

- A. Project Environmental Requirements:
 - 1. Cold Weather Concreting Procedures:
 - a. General Requirements:
 - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
 - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be 35 deg F 2 deg C minimum at time of concrete placement.
 - 3) Thaw sub-grade 6 inches 150 mm deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - b. Requirements When Average 24 Hour Temperature, midnight to midnight, Is Below 40 deg F 4 deg C:
 - 1) Temperature of concrete as placed and maintained shall be 55 deg F 13 deg C minimum and 75 deg F 27 deg C maximum.
 - 2) Heat concrete for 72 hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect. During this period, maintain concrete surface temperature between 55 and 75 deg F 13 and 27 deg C.
 - 3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of the concrete surface.
 - 4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection 24 hours after heat is discontinued.
 - 5) After heating period, if temperature falls below 32 deg F 0 deg C, protect concrete from freezing until strength of 2000 psi 14 MPa minimum is achieved. Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi 24 Mpa minimum is achieved.
 - c. Requirements When Average 24 Hour Temperature, midnight to midnight, Is Above 40 deg F 4 deg C, but when temperature falls below 32 deg F 0 deg C:
 - 1) Protect concrete from freezing for 72 hours after placing, or until a strength of 2000 psi 14 Mpa is achieved, whichever is longer. Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi 24 Mpa minimum is achieved.
 - d. Protect soil supporting concrete footings from freezing under any circumstances.
 - 2. Hot Weather Concreting Procedures:

- a. Maximum concrete temperature allowed is 90 deg F 32 deg C in hot weather.
- b. Cool aggregate and subgrades by sprinkling.
- c. Avoid cement over 140 deg F 60 deg C.
- d. Use cold mixing water or ice.
- e. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: Meet requirements of ASTM C 150, Type 5.

B. Aggregates:

1. Coarse:

- a. Meet requirements of ASTM C 33 or nonconforming aggregate that by test or actual service produces concrete of required strength and conforms to local governing codes.
- b. Aggregate shall be uniformly graded by weight as follows:
 - 1) Flat Work, Size No. 67.

Sieve	Percent Passing	Sieve	Percent Passing
One Inch	100	25 mm	100
3/4 Inch	90 - 100	19 mm	90 - 100
3/8 Inch	20 - 55	9 mm	20 - 55
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

2) All Other, Size No. 57.

Sieve	Percent Passing	Sieve	Percent Passing
1-1/2 Inch	100	38 mm	100
One Inch	95 - 100	25 mm	95 - 100
1/2 Inch	25 - 60	12 mm	25 - 60
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

2. Fine:

- a. Meet requirements of ASTM C 33.
- b. Aggregate shall be uniformly graded by weight as follows:

Sieve	Percent Passing	Sieve	Percent Passing
3/8 Inch	100	9 mm	100
No. 4	95 - 100	4.75 mm	95 - 100
No. 8	80 - 100	2.36 mm	80 - 100
No. 16	50 - 85	1.18 mm	50 - 85
No. 30	25 - 60	0.60 mm	25 - 60
No. 50	10 - 30	0.30 mm	10 - 30
No. 100	2 - 10	0.15 mm	2 - 10

C. Water: Clear, apparently clean, and potable.

D. Admixtures And Miscellaneous:

1. Mineral:

- a. Fly Ash Pozzolan: Meet requirements of ASTM C 618, Class F or C and with loss on ignition (LOI) of 3 percent maximum.

2. Chemical:

- a. No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
- b. Air Entraining Admixture:
 - 1) Meet requirements of ASTM C 260 or CSA CAN3-A23.1-M94.
 - 2) Type Two Acceptable Products:

- a) Air Mix 200 or AEA-92 by Euclid.
 - b) Air plus or Super Air Plus by Fritz-Pak.
 - c) MB-VR, MB-AE or Micro Air by Master Builders.
 - d) Sika Air by Sika.
 - e) Daravair or Darex II AEA by W R Grace.
 - f) Equal as approved by Architect before use. See Section 01 6000.
- c. Water Reducing Admixture:
 - 1) Meet requirements of C 494, Type A and containing not more than 0.05 percent chloride ions.
 - 2) Type Two Acceptable Products:
 - a) Eucon WR 75 or Eucon 91 by Euclid.
 - b) FR-2 or FR-3 by Fritz-Pak.
 - c) Pozzoloth Series by Master Builders.
 - d) Plastocrete 160 by Sika.
 - e) Daracem 50/55, WRDA-64, or WRDA-82 by W R Grace.
 - f) Equal as approved by Architect before use. See Section 01 6000.
- d. Water Reducing, Retarding Admixture:
 - 1) Meet requirements of ASTM C 494, Type D and contain not more than 0.05 percent chloride ions.
 - 2) Type Two Acceptable Products:
 - a) Eucon Retarder 75 by Euclid.
 - b) FR-1 or Modified FR-1 by Fritz-Pak.
 - c) Pozzoloth Series by Master Builders.
 - d) Plastiment by Sika.
 - e) Daratard-17 or Daratard-40 by W R Grace.
 - f) Equal as approved by Architect before use. See Section 01 6000.
- e. High Range Water Reducing Admixture (Superplasticizer):
 - 1) Meet requirements of ASTM C 494, Type F or G and containing not more than 0.05 percent chloride ions.
 - 2) Type Two Acceptable Products:
 - a) Eucon 37 or Eucon 537 by Euclid.
 - b) Supercizer 1 through 7 by Fritz-Pak.
 - c) Rheobuild 1000 or Glenium Series by Master Builders.
 - d) Sikament 300 by Sika.
 - e) Darachem-100 or WRDA-19 by W R Grace.
 - f) Equal as approved by Architect before use. See Section 01 6000.
- f. Non-Chloride, Non-Corrosive Accelerating Admixture:
 - 1) Meet requirements of ASTM C 494, Type C or E and not contain more chloride ions than are present in municipal drinking water.
 - 2) Type Two Acceptable Products:
 - a) Accelguard 80 by Euclid.
 - b) Pozzoloth NC 534 or 122HE or Pozzutec 20+
 - c) Daraset or Polarset by W R Grace.
 - d) Equal as approved by Architect before use. See Section 01 6000.
- 3. Evaporation Retardant:
 - a. Type Two Acceptable Products:
 - 1) Sure Film J-74 by Dayton Superior.
 - 2) Euco-Bar By Euclid Chemical Co.
 - 3) E-Con by L & M Construction Chemicals.
 - 4) Confilm by Master Builders.
 - 5) U S Spec Monofilm ER by U S Mix Products.
 - 6) Equal as approved by Architect before use. See Section 01 6000.
- 4. Bonding Agents:
 - a. Type Two Acceptable Products:
 - 1) Day Chem Ad Bond (J-40) by Dayton Superior.
 - 2) Flex-Con by Euclid Chemical Co.
 - 3) Larsen Weldcrete by Larsen Products Corp.
 - 4) Everbond by L & M Construction Chemicals.
 - 5) Acryl Set by Master Builders.
 - 6) Sonocrete by Sonneborn.

- 7) Tamms Bond by TAMMS Industries.
- 8) U S Spec Multicoat by U S Mix Products.
- 9) Acrylic Additive by W R Bonsal.
- 10) Intralok by W R Meadows.
- 11) Equal as approved by Architect before use. See Section 01 6000.

2.2 MANUFACTURERS

A. Contact Information:

1. Bonsal American, Charlotte, NC www.bonsal.com.
2. Dayton Superior Concrete Chemicals, Miamisburg, IL www.daytonsuperiorchemical.com.
3. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
4. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.
5. Grace Construction Products, Cambridge, MA www.graceconstruction.com.
6. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
7. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
8. Master Builders / deGussa Admixtures, Cleveland, OH www.masterbuilders.com
9. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com.
10. Sonneborn / deGussa Building Systems, Shakopee, MN www.chemrex.com.
11. TAMMS Industries, Mentor, OH www.tamms.com.
12. U S Mix Products Co, Denver, CO www.usspec.com.
13. W R Meadows, Hampshire, IL www.wrmeadows.com.

2.3 MIXES

A. Submit mix designs to meet following requirements:

1. Proportions:
 - a. Mix Type 1: (Footings and Foundations)
 - 1) Minimum weight cement per cu yd concrete: 517 lbs 235 kg.
 - 2) Water / Cement Ratio: 0.50 maximum by weight.
 - b. Mix Type 2: (Interior and Exterior Concrete)
 - 1) Minimum weight cement per cu yd concrete: 564 lbs 256 kg.
 - 2) Water / Cement Ratio: 0.45 maximum by weight.
 - c. Air Entrainment:
 - 1) Exterior Concrete: 6 percent, plus or minus 1-1/2 percent.
 - d. Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in the amount of cementitious material is allowed.
2. Admixtures:
 - a. Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
 - b. Mineral: An amount of specified fly ash not to exceed 20 percent of weight of cement may be substituted for cement. If substituted, consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
 - c. Chemical:
 - 1) 4 inch 100 mm slump maximum before addition of high range water reducer.
 - 2) 8 inch 200 mm slump maximum with use of high range water reducer.
 - 3) Specified accelerator or retarder may be used if necessary to meet environmental conditions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.

- B. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.
- C. Remove water and debris from space to be placed.

3.2 INSTALLATION

A. Site Tolerances:

1. Tolerances shall conform to requirements of ACI 117, except where specified differently.
2. Local Flatness / Levelness of Interior Slabs:
 - a. Table Four: Maximum Variation Tolerances.

Thickness, standard	plus 3/8 inch, minus 1/4 inch	plus 9 mm, 3 mm
Thickness, footings	minus 0 inch	minus 0 mm
Plan, 0 - 20 feet	1/2 inch	12 mm
Plan, 40 feet or greater	3/4 inch	19 mm
Plan, footings	plus 1/2 inch	plus 12 mm
Eccentricity, footings	2 inch max standard, 1/2 inch at masonry	50 mm max standard, 12 mm at masonry
Openings, size	minus 1/4 inch, plus One inch	minus 6 mm, plus 25 mm
Openings, location	plus / minus 1/2 inch at center	plus / minus 12 mm at center
Plumb	1/2 inch max	6 mm max
Consecutive Steps, treads	1/4 inch	6 mm
Consecutive Steps, risers	1/8 inch	13 mm
Flight of Stairs, treads	1/4 inch in total run	6 mm in total run
Flight of Stairs, risers	1/8 inch in total height	3 mm in total height

B. Placing:

1. Place as soon after mixing as possible. Deposit as nearly as possible in final position. Placing of concrete shall be continuous until a panel or section is complete.
2. In order to avoid overloading of forms and ties, observe following rate of filling for various air temperatures:
 - a. Table Five: Placing Rate.

Temperature	Rate of Fill per Hour	Temperature	Rate of Fill per Hour
40 deg F	2 feet	4 deg C	600 mm
50 deg F	3 feet	10 deg C	900 mm
60 deg F	4 feet	16 deg C	1 200 mm
70 deg F	5 feet	21 deg C	1 500 mm

3. Compact concrete in forms by vibrating and other means where required. Thoroughly work in concrete around reinforcing bars.
4. Do not embed aluminum in concrete.
5. Do not use contaminated, deteriorated, or re-tempered concrete.
6. Avoid accumulation of hardened concrete.
7. Joints:
 - a. Where possible, locate joints under partitions or where joints will cause least disruption to floor coverings.
 - b. Construction Joints: Locate where shown on Drawings to least impair strength of completed structure. Construction joints in foundation walls shall not occur within 6 feet 1 800 mm of corner and be keyed.

C. Bonding Fresh And Hardened Concrete:

1. Re-tighten forms.
2. Roughen surfaces.
3. Clean off foreign matter and laitance.
4. Wet but do not saturate.
5. Slush with neat cement grout or apply bonding agent.
6. Proceed with placing new concrete.

D. Special Requirements:

1. Footings:
 - a. Bear 18 inches 300 mm minimum into undisturbed earth or on mechanically compacted engineered fill. Exterior wall footing shall bear 18 minimum below finish grades.
 - b. Level top of finish footing and leave rough.
 - c. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, 48 inches 1 200 mm long.
2. Foundations And Walls: Leave steel projecting where required for floor tie.
3. Exterior Slabs:
 - a. Dusting with cement not permitted.
 - b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs.

E. Finishing:

1. Rubbed Finish, Exposed Vertical Surfaces:
 - a. Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
 - b. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.
2. Steel Trowel Finishes, Interior Flatwork:
 - a. Float and steel trowel interior slabs after concrete has set enough to avoid bringing water and fines to surface.
 - b. If power troweling is used, get approval of finish from Architect.
3. Broom Finishes, Exterior Flatwork Not Specified in Section 03 3053:
 - a. Broom finish exterior slabs.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
4. Rough: Top of slabs and stairs to receive setting bed for ceramic or paver tile.

F. Curing:

1. Interior Slabs:
 - a. Membrane cure as specified in Section 03 3923, if Cold Weather Concreting Procedures are necessary.
2. All Other Concrete Flatwork And Curbs: Membrane cure as specified in Section 03 3923

3.3 FIELD QUALITY CONTROL

- A. Inspection: Notify Architect three days minimum before placing concrete for footings, foundation walls, and building slabs.

3.4 ADJUSTING

- A. Remedy For Out-of-Tolerance Building Slabs:
1. Sections of slabs to be covered by carpet, which do not meet specified tolerances but are within 10 percent of specified tolerances, may be corrected by grinding or filling, at architects option. Remove and replace sections of slabs measuring outside specified correctable tolerances.
 2. If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances in carpeted areas, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.

3.5 PROTECTION

- A. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

- B. Do not allow materials resulting from construction activities, which will affect concrete or application of finish floor systems adversely, to come in contact with interior concrete slabs.

END OF SECTION

SECTION 03 3923

MEMBRANE CONCRETE CURING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of membrane concrete curing as described in Contract Documents.
- B. Related Sections:
 - 1. Section 03 3053: Miscellaneous Cast-In-Place Concrete.
 - 2. Section 32 1313: Portland cement concrete paving.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 309-03, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.'

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Exterior:
 - 1. Low VOC (less than 350 grams per liter), water-borne, membrane forming curing compound meeting requirements of ASTM C 309, Type 2.
 - a. Class Two Quality Standard: 1200 White by W. R. Meadows
 - b. Class Two Quality Standard: Vocomp 20 Cure and Seal by W. R. Meadows.

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 03 6213

NON-METALLIC NON-SHRINK GROUT

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install structural grout for securing anchor bolts and hardware in concrete and in masonry and as grout base for structural columns and light poles as described in Contract Documents.
- B. Related Sections:
 - 1. Section 04 0516: Masonry grout.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 1107-02, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).'

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Commercial non-shrink grout conforming to requirements of ASTM C 1107, Type B or Type C and providing compressive strength of 6000 psi 41MPa minimum.

2.2 MANUFACTURERS

- A. Type Two Acceptable Products:
 - 1. Normal Construction Grout A by Bonsal American, Charlotte, NC www.bonsal.com.
 - 2. Advantage 1107 Grout by Dayton Superior Corporation, Oregon, IL www.daytonsuperiorchemical.com.
 - 3. NS Grout by Euclid Chemical Co, Cleveland, OH www.euclidchemical.com.
 - 4. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
 - 5. Duragrout by L&M Construction Chemicals Inc, Omaha, NE www.lmcc.com.
 - 6. Sonneborn / deGussa Building Systems, Shakopee, MN www.chemrex.com.
 - 7. Horn Grout by TAMMS Industries Inc, Kirkland IL www.tamms.com.
 - 8. U S Spec MP Grout by U S Mix Products Co www.usspec.com.
 - 9. CG-86 Grout by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - 10. Equal as approved by Architect before installation. See Section 01 6000.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Completely eliminate air pockets and provide full contact between grout and item being grouted.

END OF SECTION

DIVISION 04: MASONRY

04 0000 MASONRY

04 0513 CEMENT AND LIME MASONRY MORTARING
04 0516 MASONRY GROUTING
04 0520 MASONRY REINFORCING

04 2000 UNIT MASONRY

04 2723 CAVITY WALL UNIT MASONRY

END OF TABLE OF CONTENTS

CEMENT AND LIME MASONRY MORTARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of masonry mortar used on Project.
- B. Related Sections:
 - 1. Sections Under 04 2000 Heading: Furnish and install mortar.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 144-03, 'Standard Specification for Aggregate for Masonry Mortar.'
 - 2. ASTM C 150-04, 'Standard Specification for Portland Cement.'
 - 3. ASTM C 207-01, 'Standard Specification for Hydrated Lime for Masonry Purposes.'

1.3 SUBMITTALS

- A. Quality Assurance / Control:
 - 1. If pre-mixed wet mortar or pre-blended dry mortar mix are to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
 - 2. If site mixed / blended mortar is to be used, provide written description of proposed method of measuring and mixing of materials.

1.4 PROJECT CONDITIONS

- A. Project Environmental Requirements:
 - 1. Cold Weather Requirements:
 - a. Cold weather, as referred to in this Section, is four hours with ambient temperature below 40 deg F 4 deg C in 24-hour period. Do not lay masonry in cold weather unless authorized by Architect.
 - b. Heat mixing water and sand as required during cold weather to produce mortar temperatures at application of between 70 and 120 deg F 21 and 49 deg C.
 - c. Heat masonry units to 40 deg F 4 deg C minimum when ambient temperature is below 20 deg F minus 7 deg C.
 - d. Provide windbreaks during construction if ambient temperature is 35 deg F 2 deg C or below and wind velocities exceed 15 mph 24 kph.
 - e. If ambient temperature is 20 deg F minus 7 deg C or below, provide enclosure for masonry under construction with heat sources and maintain temperature in enclosure at 40 deg F 4 deg C minimum.
 - f. Keep materials free of ice and snow. Do not lay masonry on frozen material.
 - 2. Hot Weather Requirements:
 - a. Hot weather, as referred to in this Section, is ambient air temperature above 100 deg F 38 deg C or ambient air temperature above 90 deg F 32 deg C with wind velocity 8 mph 13 kph or greater.
 - b. In hot weather, cool mixing water as necessary to maintain mortar and grout temperatures below 90 deg F 32 deg C.
 - c. In hot weather, prevent rapid drying of walls by using fog spray or by covering wall with plastic or wet canvas or burlap.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: Meet requirements of ASTM C 150, Type II Low Alkali unless approved otherwise in writing by Architect.
- B. Hydrated Lime: Meet requirements of ASTM C 207, Type S.
- C. Aggregate:
 - 1. Natural or manufactured sand meeting requirements of ASTM C 144 and following:
 - a. Fineness modulus: 1.6 to 2.5 percent
 - b. Water demand, ratio by weight: 0.65 percent maximum
 - c. Grading:

Sieve	Percent Passing	
	Natural Sand	Manufactured Sand
No. 4	100	100
No. 8	95 to 100	95 to 100
No. 16	70 to 100	70 to 100
No. 30	40 to 75	40 to 75
No. 50	10 to 35	20 to 40
No. 100	2 to 15	10 to 25
No. 200	none	0 to 10

Sieve	Percent Passing	
	Natural Sand	Manufactured Sand
5 000 mm	100	100
2 500 mm	95 to 100	95 to 100
1 250 mm	70 to 100	70 to 100
630 mm	40 to 75	40 to 75
315 mm	10 to 35	20 to 40
160 mm	2 to 15	10 to 25
80 mm	none	0 to 100

- D. Water: Clean and free of acids, alkalis, and organic materials.
- E. Admixtures: Use no admixtures, except for color pigments specified below, without Architect's written permission. Use of any admixture to meet cold weather requirements and admixtures that increase air entrainment are expressly forbidden under all circumstances.
- F. Mortar Color Pigment:
 - 1. High purity, chemically inert, unfading, alkali-fast mineral oxides, finely ground and especially prepared for mortar.
 - 2. Color Standard: Per architect.
 - 3. Type One Acceptable Products:
 - a. True Tone Mortar Colors by Davis Colors, Los Angeles, CA www.daviscolors.com.
 - b. SGS Mortar Colors by Solomon Colors, Springfield, IL www.solomoncolors.com.
 - c. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 MIXES

- A. Unit Masonry Mortar:
 - 1. Minimum Compressive Strength at 28 Days:
 - a. Type N: 750 psi 5.2 MPa.
 - b. Type S: 1800 psi 6.9 MPa.

2. Parts by Volume:

Type	<u>N</u>	<u>S</u>
Portland Cement	1	1
Hydrated Lime	1	1/2

- a. Damp Loose Sand: 2-1/4 minimum to three maximum, times sum of volumes of cement and lime used. Maintain sand piles in damp, loose condition.

3. Parts by Weight:

Type	<u>N</u>	<u>S</u>
Portland Cement	94 lbs	94 lbs
Hydrated Lime	40 lbs	20 lbs
Dry Sand	360 lbs minimum to 480 lbs maximum.	
Portland Cement	43 kg	43 kg
Hydrated Lime	18 lbs	9 kg
Dry Sand	163 kg minimum to 218 kg maximum	

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 04 0516

MASONRY GROUTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of masonry grout used on Project.
- B. Related Sections
 - 1. Sections under 04 2000 heading: Furnish and install masonry grout.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 94-03, 'Standard Specification for Ready-Mixed Concrete.'
 - 2. ASTM C 150-04, 'Standard Specification for Portland Cement.'
 - 3. ASTM C 207-01, 'Standard Specification for Hydrated Lime for Masonry Purposes.'
 - 4. ASTM C 404-03, 'Standard Specification for Aggregates for Masonry Grout.'
 - 5. ASTM C 1019-03, 'Standard Test Method for Sampling and Testing Grout.'

1.3 PROJECT CONDITIONS

- A. Project Environmental Requirements: Install grout under same environmental conditions as specified for mortar.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: Meet requirements of ASTM C 150. Use Type II Low Alkali in exterior walls or in walls subject to moisture, unless approved otherwise in writing by Architect.
- B. Hydrated Lime: Meet requirements of ASTM C 207, Type S.
- C. Aggregate:
 - 1. Meet requirements of ASTM C 404, Table 1.
 - a. Grading Requirements for Fine Aggregate, Natural, Size 2.

Sieve	Sieve	Percent Passing
No. 4	5 000 mm	100
No. 8	2 500 mm	95 - 100
No. 16	1 250 mm	60 - 100
No. 30	630 mm	35 - 70
No. 50	400 mm	15 - 35
No. 100	160	2 - 15

- b. Grading Requirements for Coarse Aggregate, Size 8.

Sieve	Sieve	Percent Passing
1/2 Inch	12 500 mm	100
3/8 Inch	10 000 mm	85 - 100
No. 4	5 000 mm	10 - 30

No. 8	2 500 mm	0 - 10
No. 16	1 250 mm	0 - 5

- D. Water: Clean and free of acids, alkalis, and organic materials.
- E. Admixtures: No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.

2.2 MIXES

- A. Procedure:
1. Use of pre-blended dry grout mix is allowed only with submission of certification that material specification requirements have been complied with.
 2. Use method of measuring and mixing materials that will ensure consistently proportioned grout batches throughout installation of masonry work. No measuring of materials by 'shovels full' is permitted for field mixed grout.
 3. Batch, mix, and deliver transit-mixed grout in accordance with requirements of ASTM C 94.
- B. Proportions by Volume
1. Water: Enough to give creamy pouring consistency, usually slump of between 8 and 10.

Material	Fine Grout		Coarse Grout	
Portland Cement	One cu ft	0.028 cu m	One cu ft	0.028 cu m
Hydrated Lime (optional)	1/10 cu ft	0.0028 cu m	1/10 cu ft	0.0028 cu m
Damp, Loose Sand	2-1/4 to 3 cu ft	0.063 to 0.084 cu m	2-1/4 to 3 cu ft	0.063 to 0.084 cu m
Pea Gravel	none	none	1 to 2 cu ft	0.028 to 0.056 cu m

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use fine grout for cavities 2 inches 50 mm and smaller in smallest dimension. Use coarse grout for cavities greater than 2 inches 50 mm in smallest dimension.

3.2 FIELD QUALITY CONTROL

- A. Site Testing: Test grout used in masonry bearing walls in accordance with ASTM C 1019. Test results of 2000 psi minimum are required.

END OF SECTION

MASONRY REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Masonry horizontal joint reinforcing.
 - 2. Steel masonry reinforcing bars.
- B. Related Sections:
 - 1. Sections under 04 2000 heading: Installation.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM A 615-04b, 'Standard Specification for Deformed and Plain Steel Bars for Concrete Reinforcement.'

1.3 SUBMITTALS

- A. Quality Assurance / Control:
 - 1. Reinforcing bar placement drawings.
 - 2. Mill certificate.

1.4 QUALITY ASSURANCE

- A. Tag continuous joint reinforcing with Manufacturer's name, wire size, and ASTM / CSA specification.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Steel reinforcing bars shall be free of heavy rust scales and flakes, or other bond-reducing coating at time of delivery and placing. Properly protect rebar on site after delivery.
- B. Separate steel reinforcing bars by size and tag with manufacturer's heat or test identification number.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel reinforcing bars shall have grade identification marks and meet requirements of ASTM A 615, Grade 60 minimum, 400 MPa (Grade 400) minimum. All but No. 2 bars shall be deformed type.

2.2 FABRICATION

- A. Fabricate and bend steel reinforcing bars according to 1988 edition of 'ACI Detailing Manual, and details on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Division 03 for placement of dowels out of foundations for masonry reinforcing.

END OF SECTION

CAVITY WALL UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install cavity wall unit masonry as described in Contract Documents.
 - 2. Furnish and install anchor bolts as described in Contract Documents.
- B. Related Sections:
 - 1. Section 05 0523: Quality of anchor bolts.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM A 153-01a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.'
 - 2. ASTM C 90-02, 'Standard Specification for Loadbearing Concrete Masonry Units.'
 - 3. ASTM C 216-04, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale).'
 - 4. ASTM C 331-04, 'Standard Specification for Lightweight Aggregates for Concrete Masonry Units.'
 - 5. ASTM D 1187-97 (2002), 'Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.'
 - 6. ASTM D 1227-95 (2000), 'Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.'

1.3 SUBMITTALS

- A. Product Data:
 - 1. Block color and type selection.
- B. Quality Assurance / Control: Manufacturer's certification that CMU meet compressive strength specified requirements.

1.4 QUALITY ASSURANCE

- A. Job Mock-Ups:
 - 1. 4 feet 1 200 mm long by 3 feet 900 mm high of proposed color range, texture, bond, mortar, and workmanship. Show wall construction to be used on Project, including reinforcing, rigid insulation, etc.
 - 2. Do not start work until Architect has accepted sample panel.
 - 3. Use panel as standard of comparison for masonry work built of same material.
- B. Pre-Installation Conference: Schedule pre-installation conference during construction of mock-up.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Check, carefully unload, and deliver material to site in such a manner as to avoid soiling, damaging, or snipping.
- B. Store material on planks clear of ground and protect from damage, dirt, or disfigurement.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mortar: Type 'S' as specified in Section 04 0513.

2.2 MANUFACTURED UNITS

- A. Concrete Masonry Units:
 - 1. Meet requirements of ASTM C 90, Type I, moisture control units, lightweight classification.
 - a. 85 lbs per cu ft 126 kg per cu meter minimum weight classification.
 - b. Lightweight aggregates conforming to ASTM C 331.
 - c. Do not use re-crushed masonry units as aggregate.
 - 2. Outside Corners: Square-edged, except where bull nose is indicated on Drawings.
 - 3. Use special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, etc, as required.
 - 4. Uniform color and textures with unbroken edges. Pre colored special order split face and honed where exposed and natural color where concealed.

2.3 ACCESSORIES

- A. Construction Cleaning Compounds:
 - 1. Type Two Acceptable Products:
 - a. 202 or 202V by Diedrich Technologies, Oak Creek, WI www.execpc.com/diedtech.
 - b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc, Kansas City, KS www.prosoco.com.
 - c. Equal as approved by Architect before use. See Section 01 6000.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Site Tolerances:
 - 1. Masonry work shall be true to vertical and horizontal planes within 1/8 inch 3 mm in 10 feet 3 meters, non-cumulative.
 - 2. Maintain 3/8 inch 9.5 mm mortar joints throughout.
- B. General:
 - 1. Make cuts proper size to accommodate work of other trades. Replace unit masonry in which larger than necessary openings are cut. Do not patch openings with mortar or other material.
 - 2. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- C. Laying:
 - 1. Layout:
 - a. Running bond except where indicated otherwise. Select block so there is uniform distribution of hues.
 - 2. Joints:
 - a. Tool concave. Fill completely except where indicated differently.
 - b. Do not tool until mortar has taken initial set.
 - c. Point holes in joints. Fill and tool properly.
 - 3. Concrete Masonry Units:
 - a. Lay hollow masonry units dry. Do not lay masonry on frozen material.
 - b. Align cells or cavities to preserve an unobstructed cavity for grouting.
 - c. Full bedding required on both webs and face shell under first course. Other courses need only face shell bedding except where bedding is needed to control the flow of grout.

- D. Reinforcing:
1. Reinforcing shall be free of material that may destroy bond.
 2. Masonry Reinforcing Steel:
 - a. Place steel as shown on Drawings.
 - b. Hold vertical reinforcing in place every 32 inches 800 mm.
 - c. Splice 48 bar diameters minimum.
 - d. Place reinforcing and dowels before pouring grout.
 - e. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
 - f. Place horizontal bars in 8 inch 200 mm deep bond beam units at top of wall and at 48 inches 1 200 mm on center between. Continue bond beam units and reinforcement uninterrupted around corners.
- E. Grouting:
1. CMU cells:
 - a. Fully grout all cells as follows:
 - 1) Cells containing and not containing reinforcing bars.
 - 2) Bond beams and lintel blocks.
 - b. Place grout in 48 inch 1 200 mm maximum lifts.
 - c. Consolidate grout twice by means of a mechanical vibrator. Do not use cell reinforcing to rod grout.
 - 1) Perform first consolidation immediately after placement of grout.
 - 2) Mechanically reconsolidate grout 20 minutes after first consolidation, but before loss of plasticity.
 2. Provide grout-leveling bed for support of wall plates.

3.2 CLEANING

- A. After mortar has hardened, wet masonry and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.
- B. Remove and replace defective material at Architect's direction and at no additional cost to Owner.
- C. Clean up masonry debris and remove from site.

3.3 PROTECTION

- A. Protect masonry with cover during rainy weather.
- B. Cover work at end of each workday with tarpaulins if temperature is 25 to 40 deg F minus 4 to 4 deg C. If temperature is below 25 deg F minus 4 deg C, protect with heaters. Maintain temperature around masonry to 40 deg F 4 deg C minimum for 48 hrs if Type I, 24 hrs if Type III, or longer if required.
- C. Brace masonry walls until walls attain adequate strength and are tied into building structure.
- D. Do not allow structural loading of masonry walls until walls attain adequate strength.

END OF SECTION

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DIVISION 05: METALS

05 0000 METALS

05 0523 METAL FASTENINGS

05 1000 STRUCTURAL METAL FRAMING

05 1223 STRUCTURAL STEEL FOR BUILDINGS

END OF TABLE OF CONTENTS

SECTION 05 0523

METAL FASTENING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of structural bolts used on Project.
 - 2. Requirements and standards for site welded metal-to-metal connections.
- B. Related Sections:
 - 1. Furnishing and installing of structural bolts specified under Section concerned.
 - 2. Performance of welding specified under Section concerned.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM A 36-03a, 'Standard Specification for Carbon Structural Steel.'
 - 2. ASTM A 307-03, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength.'
- B. American Welding Society / American National Standards Institute:
 - 1. AWS / ANSI D1.1-2003, 'Structural Welding Code - Steel.'
 - 2. AWS / ANSI D1.3-1998, 'Structural Welding Code - Sheet Steel.'

1.3 QUALITY ASSURANCE

- A. Qualifications: Welders shall be certified 30 days minimum before beginning work on Project. If there is doubt as to proficiency of welder, Architect may require welder to take another test, at no expense to Owner. Certification shall be by Pittsburgh Laboratories or other authority approved by Architect.
- B. Certifications: Maintain welder's certifications on job-site.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Bolts And Threaded Fasteners:
 - 1. Anchor Rods For Steeple Base Connections: Conform to ASTM A 36.
 - 2. Bolts:
 - a. Anchor Bolts: Non-headed type threaded 2 inches 50 mm minimum conforming to ASTM A 307, Grade A. Anchor hook to project 2 inches 50 mm minimum including bolt diameter.
 - b. All Other Bolts: Conform to requirements of ASTM A 307, Grade A.
- B. Arc-Welding Electrodes: Type E70XX AWS Iron and Steel Arc-welding electrodes and meeting current AISC Specifications.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Welding shall meet requirements of ANSI / AWS D1.1 and D1.3.
- B. Installation of bolts shall meet AISC requirements.

END OF SECTION

SECTION 05 1223
STRUCTURAL STEEL FOR BUILDINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Items furnished and installed:
 - 1. Miscellaneous structural steel.
- B. Related Sections:
 - 1. Section 05 0523: Quality of welding.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM A 36-03a, 'Standard Specification for Carbon Structural Steel.'
 - 2. ASTM A 53-02, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.'
 - 3. ASTM A 500-03, 'Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.'

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Channel Frames, Angles, Beams, Steel Joists, Steel Decks, And Miscellaneous Structural Steel: Meet requirements of ASTM A 36.
- B. Shop Primer:
 - 1. Concealed Steel: Fabricator's standard shop coat.
 - 2. Exposed Steel To Receive Finish: Primer shall be acceptable to Finish Manufacturer.

2.2 FABRICATION

- A. Shop prime steel provided under this Section.

PART 3 - EXECUTION: Not Used

END OF SECTION

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DIVISION 06: WOOD, PLASTICS, AND COMPOSITES

06 2000 FINISH CARPENTRY

06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

06 4000 ARCHITECTURAL WOODWORK

06 4001 COMMON ARCHITECTURAL WOODWORK REQUIREMENTS

06 4005 PLASTIC LAMINATE

06 4114 PLASTIC-LAMINATE-FACED ARCHITECTURAL WOODWORK

END OF TABLE OF CONTENTS

DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants for calking doorframes.
 - 2. Furnish and install insulation in doorframes.
- B. Products Installed But Not Supplied Under This Section:
 - 1. Flush wood doors.
 - 2. Hollow metal door frames.
 - 3. Finish hardware.
- C. Related Sections:
 - 1. Sections under 04 2000 heading: Grouting of frames installed in masonry walls.
 - 2. Section 07 2116: Quality of fiberglass insulation.
 - 3. Section 07 9213: Quality of sealants.
 - 4. Sections under 08 1000 heading: Furnishing of doors and metal frames.
 - 5. Sections under 08 7000 heading: Furnishing of finish hardware.

1.2 SUBMITTALS

- A. Quality Assurance / Control:
 - 1. Inspection report verifying correct operation and adjustment of installed hardware.
 - 2. Copy of 'Installation Guide for Doors & Hardware' by Door & Hardware Institute. Guide may be obtained from Door and Hardware Institute (DHI).

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Fire door installations shall meet code requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Wood Doors:
 - 1. Do not have doors delivered to building site until after plaster, cement, and taping compound are dry. If doors are to be stored at job-site for more than one week, seal top and bottom edges if not factory sealed.
 - 2. Store flat on a level surface in a dry, well ventilated building. Cover to keep clean but allow air circulation.
 - 3. Handle with clean gloves and do not drag doors across one another or across other surfaces.
 - 4. Do not subject doors to abnormal heat, dryness, or humidity or sudden changes therein. Condition doors to average prevailing humidity of locality before hanging.
- B. Keys: Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized and tagged.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow Metal Frames:

1. Site Tolerances:
 - a. Squareness: 1/16 inch 1.6 mm from top edge to opposite top edge.
 - b. Plumbness: 1/16 inch 1.6 mm from top of jamb to bottom of jamb.
 - c. Alignment: 1/16 inch 1.6 mm from plane of left side face of jamb to right side face of jamb.
 - d. Twist: 1/16 inch 1.6 mm across throat of jamb plane measured across each face to plane of opposite jamb throat.
 - e. Finished Clearance Between Door And Frame:
 - 1) 1/16 inch 1.6 mm at head and hinge jamb plus 1/16 inch 1.6 mm maximum
 - 2) 1/8 inch 3 mm at strike jamb plus or minus 1/16 inch 1.6 mm maximum.
 - 3) 1/2 inch 12 mm to top of finished floor surface or 1/4 inch 6 mm to top of threshold, plus or minus 1/16 inch 1.6 mm maximum.
2. Set frame in location and level head.
3. Equalize with adjustable floor anchor.
4. Set spreaders and fasten jambs to floor and wall.
 - a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
 - b. Cut notches for frame stops.
 - c. Do not remove spreaders until frames are permanently anchored in wall.
 - d. Use one spreader at base of frame and another at strike level.
 - e. Do not use temporary spreaders welded to base of jambs during installation of frame.
5. Fill gap between frame and framing with urethane foam or tightly-packed fiberglass insulation. If urethane foam is used, coat interior of frames with foam before installing frame. Trim excess before installation of frame.
6. Calking: Calk around both sides of frames of doors receiving acoustical seals with specified sealant.

B. Doors:

1. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
2. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering panels or other special details.

C. Hardware:

1. General:
 - a. Install using set of Manufacturer's installation, adjustment, and maintenance instructions submitted with hardware under Section 08 7101. Follow as closely as possible.
 - b. Mount closers on jamb stop side of door in parallel arm configuration where it is physically possible to do so and not damage or hinder operation of door or closer.
2. Hardware for Wood Doors:
 - a. If doors are not factory-machined, use hardware templates furnished by Hardware Manufacturer when mounting hardware.
 - b. Set hinges flush with edge surface. Be sure that hinges are set in a straight line to prevent distortion.
 - c. Mount door latches high in strike plate opening so when door later settles, latch will not bind.

3.2 FIELD QUALITY CONTROL

- A. Tests: Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.

END OF SECTION

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SECTION 06 4001

COMMON ARCHITECTURAL WOODWORK REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. General standards for materials and fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.
- B. Related Sections:
 - 1. Section 06 1100: Furring and blocking.
 - 2. Section 12 3623: Plastic-Laminate-Clad Countertops.

1.2 REFERENCES

- A. Architectural Woodwork Institute:
 - 1. AWI, 'Architectural Woodwork Quality Standards, 7th Edition, Version 1.0, 1997.'

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: AWI Premium Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's literature for specialty items and hardware not manufactured by Architectural Woodwork fabricator.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
- B. Protect architectural woodwork from moisture and damage while in transit to job site. Unload and store in place where it will be protected from moisture and damage and convenient to use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Laminate Veneer on $\frac{3}{4}$ " panel product.

2.2 FABRICATION

- A. Fabrication Tolerances:
 - 1. Maximum Gap: None allowed.

2. Flushness Variation: 0.015 inch 0.4 mm maximum.
- B. Fabricate work in accordance with measurements taken on job site.
- C. Fabricate so veneer grain is vertical.
- D. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 4005
PLASTIC LAMINATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Wall-hung counters.
 - 2. Countertops for custom casework.
- B. Related Sections:
 - 1. Section 06 2001:
 - a. Installation of wall-hung counters.
 - b. Installation of countertops for custom casework.
 - 2. Section 06 4001: Common Architectural Woodwork Requirements.
 - 3. Section 22 4200: Plumbing Fixtures.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A161.2-1979 (R1987), 'Performance Standards for Fabricated High Pressure Decorative Laminate Countertops.'
- B. National Electrical Manufacturer's Association / American National Standards Institute:
 - 1. NEMA / ANSI LD-3-2005, 'High Pressure Decorative Laminates.'

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature for plastic laminate.
 - 2. Color selections.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Laminates:
 - 1. Quality:
 - a. Countertops:
 - 1) Post-formed front edge and backsplash, except where detailed otherwise, with plastic laminate meeting requirements of ANSI / NEMA LD 3: PF 42.
 - a) Vertical Applications: GP 28.
 - b) Horizontal (other than countertops): GP 38.
 - 2) No raised lip on front edge.
 - b. Balancing Material: BK 20.
 - c. AWI Quality Grade: Premium.
 - 2. Assemblies:
 - a. Countertops shall meet requirements of ANSI A161.2.
 - b. Adhesives for other than post-formed types shall be spray grade, high heat resistant, neoprene contact adhesive.
 - 3. Type One Acceptable Colors: Per architect.

4. Type Two Acceptable Manufacturers:
 - a. Formica, Cincinnati, OH www.formica.com.
 - b. Nevamar, Odenton, MD www.nevamar.com.
 - c. Pionite Decorative Surfaces, Auburn, ME www.pionitelaminates.com.
 - d. WilsonArt, Temple, TX www.wilsonart.com.
 - e. Equal as approved by Architect before bidding. See Section 01 6000.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 4114

Plastic- Laminate- Faced Architectural Woodwork

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Custom casework.
- B. Related Sections:
 - 1. Section 06 2001: Installation.
 - 2. Section 06 4001: Common Architectural Woodwork Requirements.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Confirm compliance with Contract Document requirements as to configuration and dimensions of custom casework.
 - 2. Include plan and elevation views, materials used, standing and running trim profiles, assembly methods, joint details, fastening methods, accessories, and hardware.
- B. Quality Assurance / Control:
 - 1. Copy of AWI manual with shop drawing submission.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials:
 - 1. Exposed: Plastic laminate over ¾" panel product.
 - 2. Semi-exposed And Concealed: Species as acceptable for AWI premium grade.
- B. Panel Product:
 - 1. Cores:
 - a. Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft 769 kg per cu meter.
 - b. All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft 721 kg per cu meter.
 - 2. Facings:
 - a. Plastic Laminate.
 - b. All other non exposed facings shall be Melamine or Kortron.
 - 3. Edgings:
 - a. Plastic Laminate.
 - b. Non-Exposed Panel Product Edges: Hot-glued, 0.018 inch 0.46 mm thick minimum, wood grained PVC edge-banding.
 - 4. Glues used in manufacture and fabrication of panel products shall be Type I or II.

2.2 COMPONENTS

- A. Casework Doors:
 - 1. Doors under 1-3/8 inch 35 mm thick: Panel Product.

- B. Cabinet And Drawer Hardware:
1. Cabinet And Drawer Pulls:
 - a. US26D steel-plated, brass / bronze core bow handles, 4 inches 100 mm long minimum.
 - b. Type Two Acceptable Products:
 - 1) 4484 by Stanley.
 - 2) Equal as approved by Architect before installation. See Section 01 6000.
 2. Cabinet Adjustable Shelf Supports:
 - a. Either of following systems are acceptable, at Fabricator's option:
 - 1) 32mm System: Casework Fabricator's standard.
 - 2) Traditional System:
 - a) Class Two Quality Standards: 255 and 256 by Knappe & Vogt.
 3. Cabinet Hinges:
 - a. European style, self-closing.
 - b. Doors 48 inches 1 200 mm High or Less:
 - 1) 120 degree opening minimum.
 - 2) Two hinges.
 - 3) Quality Standard: C2R9A99 by Salice.
 - 4) Category Four Approved Manufacturers. See Section 01 6000 for definitions of Categories.
 - a) Julius Blum.
 - b) Grass America.
 - c) Knappe & Vogt.
 - d) Mepla-Alfit.
 - e) Salice.
 4. Cabinet Inactive Leaf Catches:
 - a. Class Two Quality Standards:
 - 1) All Other Doors: Elbow Catch No 2 by Ives.
 5. Drawer Guides:
 - a. Standard Drawers:
 - 1) Full extension, steel ball bearings, 100 lb 45 kg load rating.
 - 2) Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - a) Series 3832 by Accuride.
 - b) Series KV8400 by Knappe & Vogt.
 6. Manufacturers:
 - a. Accuride, Santa Fe Springs, CA www accuride.com.
 - b. CompX National, Mauldin, SC www.nclnet.com.
 - c. Grass America Inc, Kernerville, NC www.grassusa.com.
 - d. Hafele, Archdale, NC www.hafeleonline.com.
 - e. Ives, Indianapolis, IN www.iveshardware.com.
 - f. Julius Blum Inc, Stanley, NC www.blum.com.
 - g. Knappe & Vogt, Grand Rapids, MI www.kv.com.
 - h. Mepla-Alfit Inc, Lexington, NC www.mepla-alfit.com.
 - i. Olympus Lock Co, Seattle, WA www.olympus-lock.com.
 - j. Salice America Inc, Charlotte, NC www.saliceamerica.com.
 - k. Stanley, New Britain, CT www.stanleyworks.com.

2.3 FABRICATION

- A. Construction:
1. Cabinet Body:
 - a. Use AWI Flush construction on cabinet bodies.
 2. Drawers:
 - a. Fabricate with separate, screw-attached drawer front.
 - b. Joints shall be dowel and pressure-glued, or lock shoulder, glued, and pin nailed.
 - c. Set bottoms into sides, backs, and subfront with 1/4 inch 6 mm deep groove with 3/8 inch 9 mm minimum standing shoulder.
 - d. Every drawer shall have specified drawer guides and pull installed. Install drawer guides with 'Euro screws', and pulls with through-bolts passing through both front and sub-front.

3. Cabinet Doors:
 - a. Hinges: Install hinges using plastic insertion dowels for hinges and 'Euro screws' for baseplates.
 - b. Every cabinet door shall have specified pull installed.
- B. Cabinet Component Thickness And Material:
 1. Use plastic laminate veneer facing on panel product, except on non exposed following surfaces, where Kortron or Melamine shall be used.
 - a. Cabinet interiors and shelving faces behind cabinet doors in all rooms.
 - b. Drawer sides, backs, bottoms, and subfronts.
 2. Ends, Divisions, Bottoms, Tops: **3/4 inch 19 mm** thick panel product.
 3. Shelves:
 - a. Panel product.
 - b. Thickness:
 - 1) **30 Inch 750 mm** Span And Less: **3/4 inch 19 mm** thick.
 - 2) Spans Over **30 Inches 750 mm** To **42 Inches 1 050 mm**: **One inch 25 mm** thick.
 - 3) Spans Over **42 inches 1 050 mm**: **One inch 25 mm** thick and provide Hafele or equal center supports.
 4. Backs: **1/4 inch 6 mm** thick panel product.
 5. Doors: **3/4 inch 19 mm** thick panel product.
 6. Drawer Sides, Backs, And Subfronts: **1/2 inch 12.5 mm** thick minimum panel product.
 7. Drawer Bottoms: **1/4 inch 6 mm** thick panel product.
 8. Separate Drawer Front:
 - a. **8 Inches 200 mm** High And Less: **3/4 inch 19 mm** thick solid hardwood
 - b. More Than **8 Inches 200 mm** High: **3/4 inch 19 mm** panel product
- C. Install plastic grommets in cable access holes in countertops. Per architect.

PART 3 - EXECUTION: Not Used

END OF SECTION

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DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 1000 DAMPPROOFING AND WATERPROOFING

07 1113 BITUMINOUS DAMPPROOFING

07 2000 THERMAL PROTECTION

07 2116 BLANKET INSULATION

07 2413 DIAMOND WALL ONE-COAT SYSTEM

07 4000 ROOFING AND SIDING PANELS

07 430 COMPOSITE PANELS

07 5000 MEMBRANE ROOFING

07 5419 MECHANICALLY – ATTACHED THERMOPLASTIC MEMBRANE ROOFING

07 7000 ROOF AND WALL SPECIALTIES AND ACCESSORIES

07 7123 MANUFACTURED COLLECTORS AND DOWNSPOUTS

07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

SECTION 07 1113

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and apply bituminous dampproofing to exterior foundation walls below grade and top of footings.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Maintain dampproofing at 40 deg F 4 deg C or above before application.

1.3 PROJECT CONDITIONS

- A. Project Environmental Requirements: Do not apply when ambient temperature is below 40 deg F 4 deg C, surface temperature is below 33 deg F one deg C, or when rain is expected before applied dampproofing will dry.

1.4 SCHEDULING

- A. Do not backfill against bituminous dampproofing for 24 hours after application.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Type Two Acceptable Products:
 - 1. Ecomul-11 by Epro Waterproofing Systems, Derby, KS www.eproserv.com.
 - 2. Karnak 100 by Karnak Chemical Corp, Clark, NJ www.karnakcorp.com.
 - 3. Sealmastic Asphalt Emulsion Dampproofing Type I by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - 4. Equal as approved by Architect before application. See Section 01 6000.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Spray Application: Spray to a thickness of 10 mils minimum.
- B. Brush / Roller Application: Apply two coats of dampproofing at rate recommended by Manufacturer. Apply coats in cross hatch method so coats are applied perpendicular to each other. Before applying second coat allow first coat to dry in accordance with Manufacturer's recommendations.
- C. Apply dampproofing to cover area from 6 inches below finish grade line down to and including top of footings.

END OF SECTION

SECTION 07 2116

BLANKET INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install faced and unfaced thermal batt insulation as described in Contract Documents.
- B. Related Sections:
 - 1. Section 06 2024: Furnishing and installing of insulation in hollow metal frames.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 665-01, 'Standard Specification for Mineral-Fiber Thermal Insulation For Light Frame Construction and Manufactured Housing.'

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Thermal And Acoustic Insulation:
 - 1. Faced Insulation:
 - a. Kraft faced meeting requirements of ASTM C 665, Type II, Class C.
 - b. Foil faced meeting requirements of ASTM C 665, Type III.
 - 1) Class B: Enclosed insulation.
 - 2) Class A: Exposed insulation.
 - 2. Unfaced Insulation: Meet requirements of ASTM C 665, Type I.
 - 3. Order insulation by 'R' factor rather than 'U' factor, rating, or thickness, either 16 or 24 inches 400 or 600 mm wide according to framing spacing.
 - 4. 'R' Factor Required:
 - a. Metal Wall Stud Framing:

R11	3-1/2 inches deep	89 mm deep
R19	5-1/2 inches deep	140 mm deep
R26	7-1/2 inches deep	191 mm deep
 - 5. Type One Acceptable Manufacturers:
 - a. Certainteed Corp, Valley Forge, PA www.certainteed.com.
 - b. Guardian Fiberglass, Albion, MI www.guardianfiberglass.com.
 - c. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com.
 - d. Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
 - e. Johns Manville, Denver, CO www.jm.com.
 - f. Thermafiber, Wabash, IL www.thermafiber.com.
 - g. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 SOURCE QUALITY CONTROL

- A. Insulation shall be manufactured to be in compliance with IBC or other applicable building codes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Leave no gaps in insulation envelope.

B. In Framing:

1. Install insulation behind plumbing and wiring, around duct and vent line penetrations, and in similar places.
2. Fit ends of batts snug against top and bottom plates.
3. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material and use only foil-faced insulation.

END OF SECTION

SECTION 07 2413

DIAMOND WALL ONE-COAT SYSTEMS

PART I GENERAL

1.01 SECTION INCLUDES

- A. Provide all labor, materials, and equipment necessary to install all aspects of the Diamond Wall One-Coat Systems.

1.02 RELATED SECTIONS

- A. 03300 – Cast-in-Place Concrete
- B. 04200 – Unit Masonry
- C. 05400 – Light gauge cold-formed steel framing
- D. 06110 – Wood Framed Construction
- E. 06160 – Sheathing
- F. 07900 – Joint Sealers
- G. 09220 – Portland Cement Plaster
- H. 09250 – Gypsum Board

1.03 REFERENCES

- A. ASTM C 79 Gypsum Sheathing
- B. ASTM A 641 – Zinc Coated (Galvanized) Carbon Steel Wire
- C. ASTM C 91 – Masonry Cement
- D. ASTM C 150 – Portland Cement
- E. ASTM C 206 – Finishing Hydrated Lime
- F. ASTM C 207 – Hydrated Lime for Masonry Purposes
- G. ASTM C 847 – Standard Specification for Metal Lath
- H. ASTM C 897 – Aggregate for Job-Mixed Portland Cement Based Plaster
- I. ASTM E 119 – Method for fire test of Building Construction Materials
- J. ASTM C 926 – Application of Portland Cement-Based Plaster
- K. ASTM C 1063 – Installation of Lathing and Furring for Portland Cement Based Plaster

- L. PCA (Portland Cement Association) – Plaster (Stucco) Manual
- M. Plaster and Drywall Systems Manual, Third Edition
- N. UBC – Uniform Building Code
- O. ICC ESR-1194
- P. AC 11 – Acceptance Criteria for One-Coat Stucco Systems
- Q. Omega Diamond Wall One-Coat Systems Details

1.04 DEFINITIONS

- A. Accessories – Linear formed metal, metal and paper, or plastic members fabricated for the purpose of forming corners, edges, control joints, or decorative effects in conjunction with plaster assemblies.
- B. Base coat – Coat of plaster directly beneath the finish coat. Brown coat or base coat refers to the base coat plaster applied over wire lath/metal lath.
- C. Insulation board – An optional system component of a specific type and density that functions to reduce heat flow through the wall and serves as the surface to receive the base coat.
- D. Fasteners – Nails or staples are utilized in compliance with UBC 47-C
- E. Finish Coat – A decorative material that provides a protective, textured coating applied to the basecoat.
- F. Flashings – Metal or other membrane flashing material used to intercept and redirect the flow of water to prevent it from entering the building.
- G. Lath – A reinforcement to receive plaster. It is secured to framing or furring members.
- H. Weather Resistive Barrier – Minimum Grade D draft building paper complying with UBC Standard 14-1 is required.

1.05 SYSTEM DESCRIPTION

- A. General: The Diamond Wall One-Coat System is an Exterior Stucco System and is comprised of a weather-resistive barrier, insulation board, metal lath, Diamond Wall base coat, and a finish coat.
- B. Application Methods: The Diamond Wall One-Coat Systems are applied directly to a structure at the construction site.

1.06 SUBMITTALS

- A. Product Data: All product data sheets and details that pertain to the project
- B. Samples: Submitted upon request:

1. Samples of the Diamond Wall One-Coat System shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project.
2. Retain approved samples at the construction site throughout the application process

1.07 QUALITY ASSURANCE

A. Qualifications:

1. System component materials shall be manufactured or approved by Omega Products International, Inc. and shall be distributed by the same or its authorized dealers.
2. Plastering Contractor:
 - a. Shall specialize in cement plasterwork with documented experience.
 - b. Shall provide proof of current contractor's license and bond where required.
 - c. Shall show proof of current approved applicator certificate issued by Omega Products International, Inc.

B. On-Site Mock-Ups: Produced upon request

1. Prior to commencement of work, provide a mock-up for approval
 - a. Mock-up suitable to represent the products to be installed and each color and texture constructed using the same tools and techniques to be utilized on the project.
 - b. Retain approved mock-up at job site throughout the application process.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials to the construction site in their original, unopened packaging with labels intact.
- B. Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.
- C. Storage temperatures should generally be between 40°F and 100°F

1.09 PROJECT CONDITIONS

A. Environmental Requirements:

1. Before, during and following the application of the Diamond Wall One-Coat System, the ambient and surface temperatures must remain between 40°F and 120°F for a minimum period of 24 hours

- B. Existing Conditions:
 - 1. Access to electrical outlets, clean, potable water, and a suitable work area at the construction site throughout the application of the Diamond Wall One-Coat System

1.10 SEQUENCING AND SCHEDULING

- A. The installation of the Diamond Wall One-Coat System shall be coordinated with all other construction trades.
- B. Provide sufficient manpower to ensure continuous operation, free of cold joints, scaffolding lines, variations in texture, etc.

1.11 WARRANTY

- A. It is the responsibility of both the specifier and purchaser to determine if a product is suitable for their intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings and the like. Omega has prepared guidelines in the form of specifications, application details and product data sheets to facilitate the design process only. Omega is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Omega or otherwise, or for any changes which purchasers, specifiers, designers, or the appointed representatives may make to Omega's published documents.
- B. Upon the completion of the installation of the Diamond Wall One-Coat System Omega Products International, Inc. shall provide a standard limited warranty when requested in writing. Omega Products International, inc. shall make no other warranties, expressed or implied.

1.12 MAINTENANCE

- A. The following materials shall be presented to the owner following the application of the Diamond Wall One-Coat System:
 - 1. One container of finish for each color and texture utilized on the project.
 - 2. A maintenance program for finishes as required.

PART II: PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Omega Products International, Inc.

2.02 COMPONENTS

- A. Weather Resistive Barrier: Minimum grade D kraft building paper complying with UBC Standard 14-1, is required
- B. Insulation Board: Shall meet nominal density, length, width, and thickness as required in ICC ESR-1194
 - 1. Expanded Polystyrene Insulation Board (EPS)

- a. EPS board has a nominal density of 1.5 lbs per cubic foot, a class I flame-spread classification and a smoke developed rating not exceeding 450 and must comply with ASTM C 578-95, as Type II boards. Boards installed without sheathing over open framing are 1 inch thick and are provided with 3/8 inch high tongues with compatible grooves with horizontal joints. All boards must be recognized in a current evaluation report issued by ICC ES

C. Lath

1. Metal Lath

- a. Complies with Table 25-B of the 1997 Uniform Building Code (UBC). Furring and self-furring requirements are as set forth for Wire fabric lath.

2. Woven-Wire Mesh

- a. Minimum No. 20 gauge, 1 inch galvanized steel, woven-wire fabric. Lath must be self furring or furred when applied over all substrates except unbacked polystyrene board. Self-furring lath for coatings must comply with the following requirement: The maximum total coating thickness is 1/2"
- b. Furring crimps must be provided at maximum 6 inch intervals each way. The crimps must fur the body of the lath 1/8 inch, minimum, from the substrate after installation.

D. Sand

1. Sand must be clean and free from deleterious amounts of loam, clay, sill, soluble salts and organic matter
2. Sampling and testing must comply with ASTM C 144 or C 897
3. Sand must be graded in accordance with ASTM C 144 or C 987 or within the following limits:

RETAINED ON U.S. STANDARD SIEVE	PERCENT RETAINED BY WEIGHT +/- 2 PERCENT	
	MIN.	MAX
No. 4		0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100

E. Accessories

1. Corner Mesh: Formed Steel, minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; galvanized finish

2. Strip Mesh: Metal Lath, 3.4 lb/yd² expanded metal, galvanized, 6 in. wide x 18 in. long
 3. Casing Bead: Formed steel; minimum 24-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges; galvanized finish
 4. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, of longest possible lengths; galvanized finish
 5. Control and Expansion Joints: depth to conform to plaster thickness, maximum practical lengths, with Unijoint II, galvanized finish
 6. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place
 7. Penetration Flashing: Type I, Grade A building paper conforming to UBC Standard 14-1, 9 in. wide x length required
 8. Wire: ASTM A 641, Class I coating (galvanized), soft temper
- F. Water: Clean and potable without foreign matter
- G. Base Coat
1. Diamond Wall concentrate manufactured by Omega Products International, Inc.
- H. Finish Coat
1. AkroFlex Finishes/OmegaFlex finishes manufactured by Omega Products International, Inc.

2.03 MIXES

- A. All material mixing and tinting instructions are contained in the appropriate Product Data Sheets written and published by Omega Products International, Inc.
- B. Protect base coat and finish coat from frost, contamination, and rapid evaporation
- C. As an alternate, the Diamond Wall PM system allows the substitution of the Omega Diamond Wall PM Admix 500, an admixture composed of acrylic polymers and modifiers, of approximately one half of the water requirement. The Admix 500 is packaged in 1-gallon (3.8L) bottles, 3 ½-gallon (13.25L) pails, or 5-gallon (18.9L) pails
- D. Refer to ICC ESR-1194 for additional requirements

PART III: EXECUTION

3.01 EXAMINATION

- A. Substrates
 - 1. Acceptable substrates must be securely fastened per applicable building code requirements
 - 2. Acceptable substrates and adjacent materials must be dry, clean, and sound. Substrate surface must be flat, free of ins or planar irregularities greater than 6 mm in 3m (1/4" in 10')
- B. Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick out flashing must be properly installed prior to application of Omega Diamond Wall One-Coat System
- C. Unsatisfactory conditions shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until all unsatisfactory conditions have been corrected

3.02 SURFACE PREPARATION

- A. Clean the substrate to which the Diamond Wall One-Coat System is to be applied, ensuring that there are no foreign materials present
 - 1. Foreign materials include, but are not limited to, oil, dirt, dust form release agents, efflorescence, paint, wax, water repellants, moisture, frost and or extended nails that may rupture the weather resistive barrier
- B. Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials

3.03 INSTALLATION

- A. Weather Resistive Barrier
 - 1. Application of the barrier must comply with Section 1402.1 of the UBC. When applied over any wood-based sheathing, the barrier must be a minimum of two layers of Grade D building paper as set forth in Section 2506.4 of the code
- B. Foam Plastic Insulation Boards
 - 1. Foam Insulation board is installed over the paper prior to lath and is attached using galvanized staples or roofing nails. Vertical butt joints must be staggered at least one stud space from adjacent courses, and must occur directly over studs, accept over solid backing
 - 2. Applicator must refer to ICC ESR-1194 for detailed instructions prior to application

C. Lath

1. Wire Fabric Lath

- a. Wire of lath shall be applied with minimum 25 mm (2 inch) end laps and side laps
- b. Furring crimps shall occur at maximum 152.4-mm (6 inch) intervals each way. Furring crimps shall provide a minimum 3.18-mm (1/8-inch) clearance from the substrate after installation
- c. When end laps occur between supports, lace or wire tie the ends of the sheets with 1.2-mm (0.0475") galvanized annealed steel wire
- d. Refer to ICC ESR-1194 for additional information

2. Metal Lath

- a. Diamond Wall is applied over metal lath complying with Table 25-B of the code in lieu of Wire Fabric Lath. Metal lath fastening must comply with Table 25-C of the UBC, except the fastener length must be increased by the thickness of any substrate.

D. Base Coat

1. Apply Omega Diamond Wall by either mechanical sprayer or hand application method to the correct thickness shown below:

- a. Over EPS using 1 inch x 20 gauge wire lath shall be a minimum of 3/8 inch thick or maximum 1/2" thick
- b. Leveling Coat over concrete or concrete block using no wire lath shall be a maximum of 1/2 inch thick (bonding agents such as Omega Bond Crete may be required)

2. Moist cure the diamond Wall base coat for a minimum of 24 hours under normal conditions. Extreme heat and/or wind will require additional moist curing. Under these conditions moist cure until sufficiently hard

3. Applicator must refer to ICC ESR-1194 for detailed instructions

E. Finish

1. Omega finish products shall be applied no sooner than 14 hours following the application of the base coat. Refer to the installation instructions on the appropriate finish data sheet

2. When applying acrylic based or highly moisture resistant finish coatings the applicator of such is responsible for insuring the fresh Diamond Wall application is properly hydrated and sufficiently hard

F. Tolerances

1. Maximum variation from true flatness: 1/4 inch in 10 feet

3.04 CLEANING

- A. Remove any and all materials used, overspray from surrounding materials, and all protective masking.

END OF SECTION

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SECTION 07430

COMPOSITE PANELS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes: Composite panels, including:
 - 1. High Performance Rout and Return Dry System with PE Core Alucobond®
- B. Related Sections: Section(s) related to this section include but are not limited to:
 - 1. Structural Framing: Division 5 Metals Section
 - 2. Flashing and Sheet Metal: Division 7 Flashing Section
 - 3. Sealants (not specified in this section): Division 7 Sealant Section
 - 4. Windows: Division 8 Window Section

1.02 SYSTEM DESCRIPTION

- A. Provide a watertight Rout and Return Dry panel system, as detailed on the drawings. The panel system must consist of a dry gasket interlocking system. Any panel system utilizing a continuous field applied joint sealant is unacceptable.
- B. The panel system as detailed, shall consist of concealed dry gasketed perimeter extrusions, extruded stiffeners, gaskets, fasteners and may consist of related flashings (where architectural drawings indicate they are to be furnished under this specification section), sealants between jamb panels and previously installed adjacent construction, and other miscellaneous accessories required for a complete watertight installation. Assembly shall be water and airtight without reliance on a secondary backup membrane.

1.03 SUBMITTALS

- A. Pre-bid submittals:
 - 1. Project Listings: Submit five (5) listings of projects of similar scope and character, photographs of existing installations. Include the contact names and phone numbers for the representatives of the Owner, Architect and Contractor for each of the projects.
 - 2. Substitutions: Any proposed system must comply with the *Substitution Section 1.04 B* and submit the following:

- a. **Prior to bid approval**, submit the following ten (10) days prior to the bid date:
 - (1) Sample: Panel system specifications and 24" x 24" sample fabricated showing the typical 4-way intersection, with perimeter extrusions and stiffeners. Samples must be accessible from the backside.
 - (2) Details: Details and installation instructions showing typical edge conditions, corners joints, terminations and 4-way intersections. Details must include sealing instructions.
 - (3) Test Reports: Independent laboratory test results certifying that the proposed panel system meets or exceeds **all** the tests required in this specification.
 - b. Submit the following with the bid after the substitution has been approved:
 - (1) All costs resulting from modifications to the structure, substrates and/or other components as required by the proposed substitution. Each and every cost shall be clearly delineated in the submittal.
- B. Post-bid submittals:
- 1. Shop Drawings: Submit CAD generated shop drawings showing profiles of panel units, details of forming, joint supports, anchorages, trim, flashings, sealants and accessories. Show details of weatherproofing at edge terminations, show elevations, and layout of entire work.
 - a. Shop drawings should indicate project layout from control grid lines and elevations referring to the required details for each unique condition.
 - b. The details should show the preferred profiles and performance requirements. Provide a watertight and structurally sound, self-draining wall panel system that meets or exceeds the performance criteria set in the *Testing Section 1.05*.
 - 2. Samples: Submit an 8" x 8" sample of panel system in the specified finish complete with factory applied edge treatment, fabricated into units representative of the actual system.
 - 3. Test Reports: Submit certified test reports which meet or exceed the requirements as described in the *Testing Section 1.05*. The test report shall include the following,
 - a. Name and location of the certified independent testing laboratory with the contact phone numbers.
 - b. Date the test was performed.

- c. Unit description and system name of the panel system tested. Include the test drawings with elevations with details showing the tested panel joinery.
- 4. Report of Approval: ICC/EC Evaluation Report No. ESR-1114.
- 5. Affidavit: Certifying material meets requirements specified.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer qualifications: Installer experienced in performing work of this section who has experience in wall applications similar to that required for this project.
 - a. Installation History: Installer shall be a firm that has at least five (5) years of experience with exterior wall applications and has successfully completed installations of similar scope and size to this project.
- 2. Fabricator Qualifications: Fabricator capable of providing field service representation during construction, approving acceptable installer and application method.
 - a. Fabrication History: Panel fabricator shall assume undivided responsibility for all components of the panel work, and shall demonstrate no less than ten (10) years successful experience of metal panel work similar in scope and size to this project.
- 3. Manufacturer Qualifications: Manufacturer experienced in performing work of this section that has experience with the specified materials.
 - a. Manufacturer of the composite material must have at least ten (10) years experience in the production of the specified composite material.
 - b. ICC/EC Report: Composite panel manufacturer shall have an ICC/EC Research Report (i.e., Report ESR-1114 for Alucobond PE Core[®]).
 - c. Certification: Composite panel manufacturer shall have established a Certification Program acceptable to the local Code Authorities.
 - d. Manufacturers of the accessories and perimeter framing extrusions must have at least five (5) years experience in the production of their respective products.

B. Substitutions: Any substitution must comply with the pre-bid submittal as discussed in the *Submittal section 1.03*. No post-bid substitutions are allowed.

- 1. Any proposed system shall be approved and compatible with adjacent materials and components such that the assembly as a whole will conform

to this specification, and shall include an extruded aluminum perimeter to provide the designed architectural reveal and guttering system without the use of external field applied sealants. Any substitution must also comply with the *System Description Section 1.02* and meet or exceed the performance requirements as described in the *Testing Section 1.05* without the reliance of a secondary backup membrane.

C. Code Performance Requirements: Work of the section shall conform to all applicable codes and regulations.

1. Thermal Design Criteria:

- a. Make allowances for free and noiseless vertical and horizontal thermal movement due to the contraction and expansion of component parts, for an ambient temperature range from -20 degrees F to +180 degrees F. Buckling of panels, separation/opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement of component parts will not be permitted. Fabrication, assembly and erection procedure shall take into account the ambient temperature range at the time of the respective operation.

2. Wind Loads:

- a. Assemblies herein specified shall be designed for flexural, shear and torsional stresses for the following positive and negative wind pressures acting normal to the plane of the assemblies. Loading design shall; be based on latest Building Code but in no case less than 20 pounds per square foot with 25 pounds per square foot corner pressure.

3. Material Stress and Deflection:

- a. Normal to the plane of the wall between structural supports, deflection of the attached perimeter-framing members shall not exceed $L/175$ of span length or $3/4"$, whichever is less. The deflection at the midpoint of the panel shall not exceed $L/60$.
- b. At connection points of framing members to anchors, anchor deflection in any direction shall not exceed $1/16"$. Where connection points are not clearly defined, maximum anchor deflection shall not exceed $1/16"$.
- c. Stresses must take into account interaction and in no case shall allowable values exceed the yield stress.
- d. At 1.5 times design pressure, permanent deflections of framing members must not exceed $L/1000$ of the span length, and components must not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed $1/16"$.

1.05 TESTING

- A. Wall System Test Specimen Arrangement: The panel system test specimen must be arranged with at least four (4) panels. The panel joint arrangement shall consist of intersecting typical vertical and horizontal joints to generate a typical 4-way intersection and include the design and materials for the 4-way splice. Testing a 3-way intersection alone is not acceptable.
- B. Wall System Performance: Walls furnished under this section shall have been tested. If comparable tests are not available, mockups shall be constructed and tests performed. In either case, an independent laboratory approved by the architect shall conduct the tests. Test results shall meet or exceed the following without reliance on a secondary backup membrane:
 - 1. Air Infiltration:
 - a. When tested in accordance with ASTM E283, the air infiltration at 6.24 psf must not exceed 0.06 cfm per square foot of wall area.
 - 2. Static Water Infiltration:
 - a. When tested at a differential static pressure of 15.0 psf for 15 minutes, in accordance with ASTM E331, any uncontrolled water passing into the room-side beyond the interior barrier of the wall system shall not be permitted. The panel system shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water occurring at joints and/or condensation taking place within the wall system.
 - 3. Dynamic Water Infiltration:
 - a. Shall be tested in accordance with AAMA 501 with a slipstream velocity, creating a pressure on the wall equivalent to 15.0 psf with a water spray rate of 5 gallons per hour per square foot for 15 minutes with no uncontrolled water leakage to the room-side.
 - 4. Structural Performance:
 - a. Shall be tested in accordance with ASTM E330 at design pressure. Deflection limitations are listed previously. After initial test, test at 150% of design pressure; no permanent deformation exceeding L/1000 or failure to structural members allowed.
 - 5. Seismic Racking:
 - a. There shall be no failure or deterioration of the system when the unit is laterally racked to 3/4" in both directions and repeated for three (3) cycles. System must pass the static water requirements as described in the *Static Water Infiltration Section 1.05 A 2*, following the seismic racking.

- C. Bond Integrity Test: In accordance with ASTM D 1781-76 for bond integrity, simulating resistance to delaminating (No other test procedure is acceptable):
 - 1. Peel strength: 22.5 in lb/in (min)
- D. Fire Performance:
 - 1. ASTM E84-79 - Maximum value flame spread 0, smoke developed 0
 - 2. UBC 17-5 - No flame spread along interior face or penetration through the wall assembly
 - 3. ASTM 162 - No surface flaming

1.06 PRODUCT HANDLING

- A. After acceptance of panels on a given elevation, protection shall be the responsibility of the General Contractor.

PART 2 - PRODUCTS

2.01 COMPOSITE PANEL SYSTEM

- A. Fabricator: ESC Alucobond® Architectural Wall System manufactured by Elward Systems Corporation of Lakewood, Colorado. (800) 933-5339 or (303) 239-6303.
- B. Panel System: The panel system shall consist of Alucobond® manufactured by Alcan Composites USA Inc., Benton, Kentucky, and a system of custom aluminum extrusions as specified herein. The panel shall conform to all of the following,
 - 1. Perimeter Extrusions: Extruded aluminum with integral weather-stripping as detailed on drawings, so as to provide the following essential features,
 - a. Rout and return the Alucobond® on all perimeters. "Continuous Edge Grip" (CEG) is not acceptable.
 - b. Exposed edge of the Alucobond® shall be protected inside an extruded aluminum pocket.
 - c. Maximum overall panel thickness, including the attachment shim space, shall not exceed 2".
 - d. The Alucobond® shall be mechanically attached to all perimeter extrusions. The mechanical fastener must not penetrate any portion of the outer (exterior) skin of the aluminum composite material. Attachment of the Alucobond® to the perimeter extrusions with structural silicone is not allowed.
 - e. Do not substitute sealants for dry gasketing shown at the metal panel joinery.

2. Stiffeners: Extruded aluminum sections secured to edge trim and bonded to rear face of Alucobond® with silicone, and of sufficient size and strength to maintain flatness of the panel within the specified tolerances.
3. Reveals at Panel: Joint size between the faces of the perimeter extrusions shall be 1/2", nominal.
4. Flatness Criteria: Maximum 1/8" in 15'-0" on panel in any direction for assembled units. (Non-accumulative)

2.02 MATERIALS

A. Alucobond® Composite Material (ACM or MCM):

1. Composite: Two sheets of aluminum sandwiching a core of extruded thermoplastic, formed in a continuous process with no glues or adhesives between dissimilar materials. Total composite thickness is 4mm.
2. Face Sheets: 0.020" thick
3. Color and Coating: Silver.
4. Finish: The selected coating must meet the weathering performance criteria of AAMA 2605. Exterior surfaces shall be coil coated Kynar 500® or Hylar 5000® based polyvinylidene fluoride (PVDF) resin. Other resin-based coatings are not acceptable. In particular, the coating must have successfully passed the following tests:
 - a. Humidity Resistance
 - (1) Test Method: ASTM D-2247
 - (a) No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degrees Fahrenheit for 4,000 hours.
 - b. Salt Spray Resistance
 - (1) Test Method: ASTM B-117; expose coating system to 4,000 hours, using 5% NaCl solution.
 - (a) Minimum rating of 7 on scribe or cut edges.
 - (b) Minimum blister rating of 8 within the test specimen field.
 - c. Weather Exposure
 - (1) Outdoor
 - (a) Ten (10) year exposure at 45 degree angle facing south Florida exposure.

- (b) Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.
 - (c) Maximum chalk rating of 8 inches accordance with ASTM D-659.
 - (d) No checking, crazing, adhesion loss.
 - 5. Core: Thermoplastics
- B. Aluminum Extrusions:
 - 1. Perimeter Extrusions
 - a. Alloy: AA-6063-T5
 - b. Color: Extrusion color shall be black painted Duracon.
 - 2. Stiffeners
 - a. Alloy: AA-6063-T5
 - b. Color: Stiffeners shall have a mill finish.
- C. System Sealants:
 - 1. Sealants and gaskets within the panel system shall be per manufacturer's standards.
 - 2. Sealant color shall be black.
- D. Gaskets:
 - 1. Gaskets shall be Santoprene or EPDM.
- E. Flashings:
 - 1. Fabricate flashing from 0.062" minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Provide lap strip under flashing at abutted conditions; with lapped surfaces sealed with a full-bed of non-hardening sealant.
- F. Fasteners:
 - 1. Attachment of the panel system to the primary panel structural supports shall be made using a Drill-Flex® Fastener by ELCO Textron Inc.
 - 2. Typical joinery shall be attached with concealed fasteners. When exposed fasteners are required in isolated conditions, the fastener shall be obscured in the panel joinery.

2.03 FABRICATION

- A. Fabricate panel units to dimensions indicated on the drawings based on an assumed design temperature of +70 degrees F. Allow for ambient temperature range at time of fabrication and erection.
- B. Fabricate panels in sizes shown using composite aluminum panel material and perimeter extrusion so that the panel thickness at the joinery is no more than 1.75". Completed panel shall be properly fabricated and designed so that no restraints are placed on the panel, which might result in excessive compressive skin stresses. The installation detailing shall be such that the installed panels shall remain flat due to temperature changes and at all times remain water and air-tight. Oil canning of panel surface is not acceptable.
- C. Where practical, shop fabricate units ready for erection. If not shop assembled, pre-fabricate components at the shop as required for proper and expeditious field assembly.
- D. Design, fabricate, assemble, and erect wall panel units, to insure a weather tight system, as required in this specification section.
- E. Where drawings indicate, factory curve panels to required radii. Extrusions shall be factory stretched formed to conform to panel curve.
- F. Provide stiffeners secured to rear face of panels mechanically fastened to edge trim members, with spacing as required by specific job wind loading.

PART 3 – EXECUTION

3.01 DELIVERY AND STORAGE

- A. Delivery: Deliver fabricated units and component parts identified per erection drawings.
- B. Protection of Surfaces: Protect surfaces from damage during shipping and erection. Inspect work for damage upon delivery - no damaged work permitted on job site.
- C. Storage: Coordinate with General Contractor for storage space.
- D. Panel Penetrations: Penetrations including those shown on the Architectural Drawings that are required by other trades shall be done by the trade involved, unless noted otherwise.

3.02 INSPECTION

- A. Examine supporting structure and conditions under which the work is to be erected, and notify the Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Install in compliance with manufacturer's product data, including shop drawings, installation instructions, technical bulletins, and special detailing pertaining to the any specific condition.
- B. Erect panel work in a square, plumb, strait, and true, accurately fitted manner.
- C. Do not install component parts, which are observed to be defective, including warped, bowed, dented, abraded and/or broken members.
- D. Do not cut, trim, weld, or braze component parts during erection, in a manner which would damage finish, decrease strength, or result in a visual imperfection or a failure in system performance. Return component parts that require alteration to shop for re-fabrication, if possible, or for replacement by new parts.
- E. Apply a coat of bituminous paint, concealed, on one or both surfaces wherever dissimilar metals would otherwise be in contact. Use gasketed or approved coated fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.
- F. Anchor panels securely in accordance with the approved shop drawings to allow for the necessary thermal movement and structural support as specified above.

3.04 CLEANING AND PROTECTION

- A. After installation of panels on a given elevation, any additional protection shall be the responsibility of the General Contractor.
- B. Deposit all trash from panel shipping crates in General Contractor's furnished debris boxes.
- C. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- D. Remove protective film at time of panel installation.

END OF SECTION

ADDITIONAL NOTES FOR SPECIFICATION WRITER

- 1) Other possible additions to this specification may include:
 - a) Window system that integrates with panel system having minimal exposed sealants between panel and window units (Contact Elward Systems Corporation).
- 2) If other panel systems must be named, contact ESC for comparable materials that can be integrated into the panel system and meet the quality assurance portion of this specification.
- 3) Contact ESC for specifications on these other ESC systems:
 - a) RRW138 system (A Rout & Return Wet System)
 - b) ESC systems utilizing Alucobond® Plus
 - c) ESC systems utilizing Reynobond or Apolic material
 - d) Custom ESC systems

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**SECTION 075419.05
MECHANICALLY-ATTACHED
THERMOPLASTIC MEMBRANE ROOFING**

PART 1 - GENERAL CONDITIONS**1.01 DESCRIPTION****A. Scope**

To install a mechanically-attached Sarnafil roofing membrane, or equal prior to bidding with flashings and other components to comprise a roofing system.

B. Related Work

The work includes but is not limited to the installation of:

1. Substrate Preparation
2. Roof Drains
3. Insulation
4. Separation Layers
5. Roof Membrane
6. Fasteners
7. Adhesive
8. Roof Membrane Flashings
9. Metal Flashings
10. Sealants

C. Upon successful completion of work the following warranties may be obtained:

1. Sarnafil Warranty
2. Roofing Contractor Warranty

1.02 QUALITY ASSURANCE**A. This roofing system shall be applied only by a Roofing Contractor authorized by Sarnafil prior to bid (Sarnafil "Applicator").****B. Upon completion of the installation and the delivery to Sarnafil by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and Sarnafil's requirements, an inspection shall be made by a Technical Representative of Sarnafil to review the installed roof system.****C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and Sarnafil.****D. All work pertaining to the installation of Sarnafil membrane and flashings shall only be completed by Applicator personnel trained and authorized by Sarnafil in those procedures.****1.03 SUBMITTALS**

At the time of bidding, the Applicator shall submit to the Owner (or Representative) the following:

A. Copies of Specification.**B. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.**

- C. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.
- D. Sample copy of Sarnafil's warranty.
- E. Sample copy of Applicator's warranty.
- F. Dimensioned shop drawings which shall include:
 - 1. Outline of roof with roof size and elevations shown.
 - 2. Profile details of flashing methods for penetrations.
 - 3. Technical acceptance from Sarnafil.
- G. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.
- H. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.
- I. Material Safety Data Sheets (MSDS)

1.04 CODE REQUIREMENTS

The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

- A. Factory Mutual Research Corporation (FM) - Norwood, MA
 - 1. Class (1-90)
- B. Underwriters Laboratories, Inc. - Northbrook, IL
 - 1. Class A assembly

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
- D. All adhesives shall be stored at temperatures between 40° F (5° C) and 80° F (27° C).
- E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- F. All materials which the owner's representative and/or Sarnafil determine to be damaged are to be removed from the job site and replaced at no cost to the owner.

1.06 JOB CONDITIONS

- A. Sarnafil materials may be installed under certain adverse weather conditions but only after consultation with Sarnafil, as installation time and system integrity may be affected.

- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
- G. The Applicator is cautioned that certain Sarnafil membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with Sarnafil membranes. The Applicator shall consult Sarnafil regarding compatibility, precautions and recommendations.
- H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Sarnafelt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
- I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- J. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- K. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.
- L. All new roofing waste material (i.e., scrap roof membrane, release paper, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.
- M. The Applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- N. Installation of a Sarnafil membrane over coal tar pitch or a resaturated roof requires special consideration to protect the Sarnafil membrane from volatile fumes and materials. Consult Sarnafil for precautions prior to bid.
- O. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.
- P. All rooftop contamination that is anticipated or that is occurring shall be reported to Sarnafil to determine the corrective steps to be taken.
- Q. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to Sarnafil) to the Owner's Representative for corrective action prior to the installation of the Sarnafil roof system.

- R. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction at the Owner's expense (letter copy to Sarnafil).
- S. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.
- T. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.
- U. The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to help verify condition of the deck/substrate and to confirm expected pullout values.
- V. The Sarnafil membrane shall not be installed under the following conditions without consulting Sarnafil's Technical Dept. for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
 - 3. The wall/deck intersection permits air entry into the wall flashing area.
- W. Precautions shall be taken when using Sarnacol adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.
- X. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

1.07 BIDDING REQUIREMENTS

A. Pre-Bid Meeting:

A pre-bid meeting shall be held with the Owner's Representative and involved trades to discuss all aspects of the project. The Applicator's field representative or roofing foreman for the work shall be in attendance. Procedures to avoid rooftop damage by other trades shall be determined.

1.08 WARRANTIES

A. Sarnafil Membrane Warranty

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil Membrane Warranty shall be issued.

B. Sarnafil Standard Warranty

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil Standard Warranty shall be issued.

C. Sarnafil System Warranty (only products purchased from Sarnafil are covered under System Warranty)

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil System Warranty shall be issued.

D. Applicator/Roofing Contractor Warranty

The Applicator shall supply the Owner with a separate workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no

cost to the Owner. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to Sarnafil.

E. Owner Responsibility

Owner shall notify both Sarnafil and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The components of the Sarnafil Sarnafast mechanically-attached roof system are to be products of Sarnafil as indicated on the Detail Drawings and specified in the Contract Documents.
- B. Components to be used that are other than those supplied or manufactured by Sarnafil may be submitted for review and acceptance by Sarnafil. Sarnafil's acceptance of any other product is only for a determination of compatibility with Sarnafil products and not for inclusion in the Sarnafil warranty. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with Sarnafil products.

2.02 MEMBRANE

- A. Sarnafil® S327 polyester reinforced membrane with a lacquer coating.
- B. Membrane shall conform to ASTM D4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing," Classification: Type III.
- C. As Manufactured, membrane shall conform to the following physical properties:
1. Color to be White. (if other than Standard color)
 2. Thickness to be 60 mil. (if other than 48 mil)

<u>Parameters</u>	<u>ASTM Test Method</u>	<u>Minimum ASTM Requirement</u>	<u>Sarnafil Typical Physical Properties</u>
Reinforcing Material	-		Polyester
Overall Thickness, min., inches (mm)	D751	0.045 (1.14)	0.048 (1.20)
Breaking Strength, min., lbf/in. (KN/m)	D751	200 (35.0)	230 (40.0)
Elongation at Break, min.	D751	15%	20%
Seam strength*, min. (% of breaking strength)	D751	75	85
Retention of Properties After Heat Aging	D3045	-	-
Breaking Strength, min., (% of original)	D751	90	95
Elongation, min., (% of original)	D751	90	90
Tearing Strength, min., lbf (N)	D1004	45.0 (200)	50 (220)
Low Temperature Bend, -40°F (-40°C)	D2136	Pass	Pass
Accelerated Weathering Test (Xenson Arc)	D2565	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7 x magnification)	-	None	None
Linear Dimensional Change	D1204	0.5% max.	0.1%
Weight Change After Immersion in Water	D570	± 3.0% max.	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 14.7 ft-lbf (20 J)	D5635	Pass	Pass

* Failure occurs through membrane rupture not seam failure.

2.03 FLASHING MATERIALS**A. Wall/Curb Flashing****1. Sarnafil G410 Membrane**

A fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive. Consult Product Data Sheets for adhesive options and additional information.

2. Sarnafil G459 Membrane

An asphalt-resistant, fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive. Consult Product Data Sheet for adhesive rates and additional information.

3. Sarnafil S327 Membrane

A polyester reinforced membrane used for mechanically-attached flashings to approved substrate using Sarnadisc or Sarnabar. Consult Sarnafil Product Data Sheet for adhesive rates and additional information.

4. Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0m). Consult Product Data Sheet for additional information.

B. Perimeter Edge Flashing**1. Edge-Tite Flashing**

A prefabricated perimeter edge attachment and fascia assembly provided by Sarnafil. Edge-Tite is made from three distinct parts. The (base) rail is made of formed 0.050 inch (1.3 mm) thick, 5052-H32 mill-finish alloy aluminum in 12 foot (3.6 m) lengths, provided with predrilled fastening holes. The spring clips are 6 inches (152 mm) wide and made from 0.020 inch (0.5 mm) stainless steel. The snap-on fascia is made from 24 gauge (0.6 mm) G90 steel or from 0.040 inch (1.0 mm) aluminum in 12 foot (3.6 m) lengths. Edge-Tite is available in a variety of fascia widths. Color and fascia metal shall be _____. Consult Product Data Sheet for additional information.

2. Anchor-Tite® Flashing

A heavy-duty prefabricated perimeter edge attachment and fascia assembly provided by Sarnafil. Anchor-Tite is made of two distinct parts. The anchor bar is extruded 0.125 inch (3.0 mm) thick from 6063-T6 alloy aluminum in 12 foot (3.5 m) lengths, provided with predrilled fastening holes. Snap-on fascia covers are formed from either 24 gauge galvanized steel with Kynar® or 0.40 inch (10 mm) aluminum with Kynar®, anodized or mill finish. Anchor-Tite is available in a variety of fascia widths. Color and fascia metal type shall be _____.

3. Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0m). Consult Product Data Sheet for additional information.

4. Non-Typical Edge

Project-specific perimeter edge detail reviewed and accepted for one-time use by Sarnafil's Technical Department. Consult Regional Technical Manager prior to job start for review and consideration for acceptance.

C. Miscellaneous Flashing

1. Sarnaflash

A prefabricated expansion joint cover made from Sarnafil membrane. Sarnaflash is designed for securement to vertical or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4½ inches (25 mm to 114 mm) across. Available in 40 foot (12 m) rolls. Consult Product Data Sheet for additional information.

2. Sarnareglet

A heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Sarnareglet is produced from 6063-T5, 0.10 inch - 0.12 inch (2.5 mm - 3.0 mm) thick extruded aluminum. Sarnareglet has a 2¼ inch (57 mm) deep profile, and is provided in 10 foot (3 m) lengths. Use prefabricated Sarnareglet mitered inside and outside corners where walls intersect. Consult Product Data Sheet for additional information.

3. Sarnastack

A prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick Sarnafil G410 membrane. Available in five different sizes. Consult Product Data Sheet for sizes and additional information.

4. Sarnadrain-RAC

PVC-coated, heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Sarnadrain-RAC is made of 0.080 inch (2 mm) thick 6063 aluminum with a urethane seal installed at the end of the drainpipe. The large 14 inch x 14 inch (0.36 m x 0.36 m) drain strainer is also made of 0.080 inch (2 mm) thick aluminum stock. The flange dimensions of Sarnadrain-RAC are 18 inches x 18 inches (0.46 m x 0.46 m). Consult Product Data Sheet for sizes and additional information.

5. Sarnacircle-"S"

Circular 0.048 inch (48 mil/1.2 mm) thick S327 membrane patch welded over T-joints formed by overlapping thick membranes.

6. Sarnafiller

A urethane sealant used for pitch pocket topping. Sarnafiller is a two component sealant. Sarnafiller cures with excellent elasticity and adhesion to various surfaces. Consult Product Data Sheet for additional information.

7. Sarnacorners

Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Sarnaclad base flashings. Sarnacorners are available in 2 outside sizes (5 inch and 8-1/2 inch diameter/ 127 mm and 215mm) and 1 inside size. Consult Product Data Sheet for additional information.

8. Multi-Purpose Sealant

A proprietary sealant used at flashing terminations. Consult Product Data Sheet for additional information.

9. Sarnacol 2170 Adhesive

A solvent-based reactivating-type adhesive used to attach membrane to flashing substrate. Consult Product Data Sheets for additional information.

10. Sarnacol 2126

A water-based contact-type adhesive used to attach the membrane to the flashing substrate. Consult Product Data Sheets for additional information.

11. S327 Coverstrip

9 inch (0.23 m) wide precut flashing made from Sarnafil S327 polyester reinforced membrane. Used to coverstrip Sarnabar and Sarnadisc.

2.04 INSULATION/OVERLAYMENT/RECOVER BOARD

A. Sarnatherm Insulation

A rigid isocyanurate foam insulations with black mat facers. Sarnatherm is available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thickness. Consult Sarnafil Product Data Sheets for additional information.

B. DensDeck®

A siliconized gypsum, fire-tested hardboard with glass-mat facers. DensDeck is provided in a 4 ft x 8 ft (1.2 m x 2.4 m) board size and in thicknesses of 1/4, 1/2 inch and 5/8 inch (13 mm and 16 mm). Consult Sarnafil Product Data Sheet for size, thickness and additional information.

C. SarnabARRIER

A spun-bonded polyester fabric separation layer used to separate the membrane from unfaced extruded or expanded polystyrene. Consult Sarnafil Product Data Sheet for additional information.

2.05 ATTACHMENT COMPONENTS

A. Sarnaplate

Used with various Sarnafasteners to attach insulation boards to roof deck. Sarnaplate is a 3 inch (75 mm) square or round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Sarnafil Product Data Sheet for additional information.

B. Sarnaplate-HD/CD

Used with Sarnafastener-HD or Sarnafastener-CD10 to attach insulation boards to wood or concrete roof decks. Sarnaplate-HD/CD is a 3 inch (75 mm) round stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Sarnafil Product Data Sheet for additional information.

C. Sarnaplate-Preassembled

Combination of a 3 inch round plate and a #12 fastener used to attach insulation boards to steel or wood roof decks. Sarnaplate-Preassembled consists of a 3 inch (75 mm) round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating and Sarnafastener #12 with modified buttress thread. The fastener shank diameter is approximately 0.168 inch (4 mm) and the thread diameter is approximately 0.214 inch (5 mm). Consult Sarnafil Product Data Sheet for additional information.

D. Sarnabar

An FM-approved, heavy-duty, 14 gauge, galvanized or stainless, roll-formed steel bar used to attach membrane to the roof deck. The formed steel is pre-punched with holes every 1 inch (25mm) on center to allow various Sarnafastener spacing options. Consult Sarnafil Product Data Sheet for additional information.

E. Sarnafastener #12

A #12 corrosion-resistant fastener used with Sarnaplates to attach insulation boards to steel or wood roof decks. Sarnafastener #12 has a modified buttress thread, a shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Sarnafil Product Data Sheet for additional information.

F. Sarnafastener-CD10

A nail-in, corrosion-resistant fastener used with Sarnaplate-HD/CD or Sarnabar to attach insulation or membrane to normal-weight concrete roof deck. Sarnafastener-CD10 has a shank diameter of 0.215 inch (5.5mm), a split diameter of 0.265/0.275 inch (6.7/7.0 mm) and a flat head with a 0.435 inch (11mm) diameter. Consult Sarnafil Product Data Sheet for additional information.

G. Sarnafastener-HD

A #14 corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation boards or with Sarnadisc and Sarnabar to attach membrane to structural concrete or wood roof decks. Sarnafastener-HD has a shank diameter of 0.190 inch (4.8 mm), a thread diameter of 0.245 inch (6.2 mm) and a #3 Phillips drive head with a diameter of 0.435 inch (11 mm). Consult Sarnafil Product Data Sheet for additional information.

H. Sarnafastener-XP

A #15, heavy-duty, corrosion-resistant fastener used with Sarnaplate to attach insulation or Sarnadisc, Sarnadisc-XP and Sarnabar to attach Sarnafil S327 roof membrane to steel or wood roof decks. Sarnafastener-XP has a shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Sarnafil Product Data Sheet for additional information.

I. Sarnacord

A 5/32 inch (4 mm) diameter, red-colored, flexible thermoplastic extrusion that is welded to the top surface of the Sarnafil membrane and against the side of the Sarnabar, used to hold the membrane in position. Consult Sarnafil Product Data Sheet for additional information.

J. Sarnadisc

A high strength plate used with Sarnafasteners to attach Sarnafil S327 roof membrane directly to roof decks. Sarnadisc is a 20 gauge (0.9 mm), 2 inch (50 mm) diameter corrosion resistant steel plate. Consult Sarnafil Product Data Sheet for additional information.

K. Sarnadisc-XP

Sarnadisc-XP is a high strength, linear plate used with Sarnafastener-XP to attach Sarnafil S327 roof membrane to the steel or wood roof decks. Sarnadisc-XP is an 18 gauge (1.2 mm), 2 inch by 3¾ inch (50 mm x 95 mm) corrosion resistant steel plate. Consult Sarnafil Product Data Sheet for additional information.

L. Sarnafastener-NTB-1H

Sarnafastener-NTB-1H is a specially designed fastener used with a specially designed 3 inch (75 mm) plate to attach insulation boards to certain gypsum, cementitious wood fiber and lightweight concrete roof

decks. Sarnafastener-NTB-1H is a molded product made of fiberglass-filled nylon. Consult Sarnafil Product Data Sheet for additional information.

M. Sarnafastener-NTB-1H-WW

Sarnafastener-NTB-1H-WW is a specially designed fastener used with a specially designed 2 inch (50 mm) disc to attach Sarnafil S327 roof membrane to certain gypsum, cementitious wood fiber and lightweight concrete roof decks. Sarnafastener-NTB-1H-WW is a molded product made of fiberglass-filled nylon and locking wire barbs. Consult Sarnafil Product Data Sheet for additional information.

2.06 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape

A 2 inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

B. Sealing Tape Strip

Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and wind blown moisture entry.

C. Sarnamatic 641mc

220 volt, self-propelled, hot-air welding machine used to seal long lengths of Sarnafil membrane seams.

D. Perimat Welder

120 volt, self-propelled, hot-air welding machine used to seal long –lengths of Sarnafil membrane seams along perimeter details.

E. Sarnasolv

A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Sarnasolv is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled. Consult Product Data Sheet for additional information.

2.07 SEALANTS AND PITCH POCKET FILLERS

A. Sarnafil Multi-Purpose Sealant (for termination details).

B. Sarnafiller (two-part urethane filler for pitch pocket toppings).

C. Depending on substrates, the following sealants are options for temporary overnight tie-ins:

1. Type III hot asphalt conforming to ASTM D312 (latest revision).
2. Sarnafiller.
3. Multiple layers of roofing cement and felt.
4. Spray-applied, water-resistant urethane foam.
5. Mechanical attachment with rigid bars and compressed sealant.

2.08 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic

corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION CONFERENCE

- A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.
- B. The meeting shall discuss all aspects of the project including but not limited to:
 - 1. Safety
 - 2. Set up
 - 3. Construction schedule
 - 4. Contract conditions
 - 5. Coordination of the work

3.02 SUBSTRATE CONDITION

- A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.
- B. Applicator shall verify that the work done under related sections meets the following conditions:
 - 1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
 - 2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
 - 3. All surfaces are smooth and free of dirt, debris and incompatible materials.
 - 4. All roof surfaces shall be free of water, ice and snow.

3.03 SUBSTRATE PREPARATION

The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner as to eliminate risk of deck overload due to concentrated weight. The Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location.

- A. New Construction
 - 1. Steel Deck:
 - a) FM approved steel deck - The roof deck shall be 22 gauge (minimum) grade E and shall conform and be installed to meet the latest revision of FM's Loss Prevention Data Sheet 1-28 and the local code's current requirements.
 - b) Non-FM approved steel deck - The roof deck shall be 24 gauge (minimum) grade D and shall conform and be installed to the local code's current requirements.

3.04 SUBSTRATE INSPECTION

- A. A dry, clean and smooth substrate shall be prepared to receive the Sarnafil Sarnafast mechanically-attached roof system.
- B. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.
- C. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.
- D. All roof surfaces shall be free of water, ice and snow.
- E. Sarnafil shall be applied over compatible and accepted substrates only.

3.05 WOOD NAILER INSTALLATION

- A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.
- B. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.
- C. Thickness shall be as required to match substrate and/or insulation height to allow a smooth transition.
- D. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

3.06 INSULATION INSTALLATION

General Criteria:

- A. Insulation shall be installed according to insulation manufacturer's instructions.
- B. Insulation shall be neatly cut to fit around penetrations and projections.
- C. Install tapered insulation in accordance with insulation manufacturer's shop drawings.
- D. Install tapered insulation around drains creating a drain sump.
- E. Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.
- F. Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.
- G. Mechanical Attachment
 - 1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's, FM's and Sarnafil's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

2. Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer and Sarnafil.
3. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

3.07 SEPARATION LAYER INSTALLATION

Approved separation layer shall be installed directly over expanded or extruded polystyrene (unless supplied with a approved, compatible facer). Unfaced polystyrene is incompatible with Sarnafil membranes without a separation layer.

A. General Criteria

1. Separation layer shall be installed according to Sarnafil's instructions.
2. Separation layer shall be neatly cut to fit around penetrations and projections.
3. Do not install more separation layer than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.
4. Mechanical Attachment:
 - a) Separation layer shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to Sarnafil's recommendations for fastening rates and patterns.
 - b) Fasteners are to be installed in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by fastener manufacturer and Sarnafil.
 - c) Overlap separation layer edges 4 inches (100 mm) and fasten through the overlaps at 24 inches (0.6 m) on center using Sarnafasteners and Sarnaplates to hold in position. The installation of the separation layer is to be followed immediately by the installation of the S327 membrane.

3.08 INSTALLATION OF SARNAFIL MEMBRANE

- A. The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

B. General

1. Sarnafil S327 membrane is to be attached with Sarnafasteners and Sarnabar according to Sarnafil's and Factory Mutual's requirements.
2. Membrane overlaps shall be shingled with the flow of water where possible.
3. Sarnafil full-width (78-5/8 inch or 2 meter) rolls shall be fastened perpendicular to the direction of the steel deck flutes, wood plank, precast or cementitious wood fiber panel where possible.
4. **Tack welding of S327 full or half-width rolls for purposes of temporary restraint during installation is not permitted.** Consult Sarnafil's Technical Department for further information.

C. Perimeter and Corner Areas

1. Over the properly installed and prepared substrate surface, S327 half-width (39 inches or 1 meter) rolls are to be installed with the entire perimeter edge. The number of adjacent half-rolls will be determined by building height and width and other conditions according to FM guidelines and Sarnafil Technical. Sarnafasteners and Sarnadiscs are installed along the edge of the membrane on the fastening line at a spacing determined by Sarnafil and the Owner's Representative/Designer. Sarnadisc are held-back 1 inch (25 mm) from the outer edge of the membrane. The adjacent half-roll is positioned to overlap the fastened edge of the first half-roll by 5-1/2 inches (140 mm) in accordance with the overlap lines marked on it's edge. The 5-1/2 inch (140 mm) overlap will allow the top membrane to extend 2-1/2 inches (63 mm) past the Sarnadisc for heat-welding. Fasteners shall clamp the S327 membrane tightly to the substrate. In corner areas where perimeter half-rolls intersect, add rows of Sarnafasteners and Sarnadiscs over the top the half-rolls and weld a (S327) coverstrip above them for watertightness. See Detail Drawings.

Notes:

- a) Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary being treated as a perimeter. Typically, internal expansion joints and firewalls are not considered to be full perimeters. Refer to Factory Mutual's Data Sheet 1-28 for more information.
- b) The ridge area is defined as the high point in the roof area formed by two intersecting planes. When the sum of the slopes is a minimum of 4 inches in 12 inches (30 degrees), each side of the ridge shall be treated as a perimeter area.

2. **Hot-air weld overlaps according to Sarnafil's requirements. Take test cuts at least 3 times per day.**

D. Interior Area

1. Over the properly installed and prepared substrate surface, S327 full-width (78-5/8 inches or 2 meters) rolls are to be installed parallel to the steel deck flutes, wood plank or wood or concrete panels. Sarnafasteners and Sarnadiscs are installed along the edge of the membrane on the fastening line at a spacing determined by Sarnafil and the Owner's Representative/Designer. Sarnadisc are held-back 1 inch (25 mm), from the outer edge of the membrane. The adjacent full-roll is positioned to overlap the fastened edge of the first full-roll by 5-1/2 inches (140 mm) in accordance with the overlap lines marked on it's edge. The 5-1/2 inch (140 mm) overlap will allow the top membrane to extend 2-1/2 inches (63 mm) past the Sarnadiscs for heat-welding. Fasteners shall clamp the S327 membrane tightly to the substrate. See Detail Drawings.
2. **Hot-air weld overlaps according to Sarnafil's recommendations. Take test cuts at least 3 times per day.**

E. Securement Around Perimeter and Rooftop Penetrations

1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, Sarnafasteners and Sarnadiscs shall be installed according to perimeter rate of attachment. Fasteners shall be installed according to the manufacturer's instructions. Fasteners shall be installed using the fastener manufacturer's recommended torque-sensitive fastening tools with depth locators. Fasteners shall clamp the Sarnafil membrane tightly to the substrate.
2. Sarnafil membrane flashings shall extend 2-1/2 inches (63 mm) past the Sarnadisc and be hot-air welded to the Sarnafil deck membrane.

3.09 HOT-AIR WELDING OF SEAM OVERLAPS

A. General

1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
2. Welding equipment shall be provided by or approved by Sarnafil. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Sarnafil Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry.

B. Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of Sarnafil's automatic welding equipment. When using this equipment, Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Sarnafil's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.10 MEMBRANE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

A. Sarnacol Adhesive for Membrane Flashings

1. Over the properly installed and prepared flashing substrate, Sarnacol adhesive shall be applied according to instructions found on the Product Data Sheet. The Sarnacol adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

B. Install Sarnadiscs according to the Detail Drawings with approved Sarnafasteners into the structural deck at the base of parapets, walls and curbs. Sarnadiscs may be required by Sarnafil at the base of all tapered edge strips and at transitions, peaks, and valleys according to Sarnafil's details.

C. Sarnafil's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by Sarnafil prior to installation.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Sarnafil Technical Department.

- E. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the Sarnafil membrane.
- F. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop at 6-8 inches (0.15-0.20 m) on center.
- G. Sarnafil flashings shall be terminated according to Sarnafil recommended details.
- H. All adhered flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Sarnafil Technical Department for securement methods.
- I. All mechanically-attached flashings that exceed 18 inches (0.46 m) in height shall receive additional securement. Consult Sarnafil Technical Department for securement methods.

3.11 SARNACLAD METAL BASE FLASHINGS/EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

- A. Sarnaclad metal flashings shall be formed and installed per the Detail Drawings.
 - 1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).
 - 2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
- B. Adjacent sheets of Sarnaclad shall be spaced ¼ inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4 inch minimum (100 mm) wide strip of Sarnafil flashing membrane shall be hot-air welded over the joint. Exercise caution at perimeter of roof.

3.12 METAL FLASHINGS

- A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
 - 1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
 - 2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.
- B. Metal, other than that provided by Sarnafil, is not covered under the Sarnafil warranty.
- C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.
- D. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.
- E. Metal joints shall be watertight.
- F. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

- G. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.
- H. Counter flashings shall overlap base flashings at least 4 inches (100 mm).
- I. Hook strips shall extend past wood nailers over wall surfaces by 1-½ inch (38 mm) minimum and shall be securely sealed from air entry.

3.13 EDGE-TITE METAL

- A. Position the Sarnafil membrane over the roof edge and down outside face of wall covering wood nailer(s) completely. Allow ½ inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.
- B. Apply a 3/8 inch (10 mm) bead of Sarnafil sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).
- C. Fasten base rail into the side of the nailer 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Edge-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.
- D. Position spring clips at 6 foot (1.8 m) centers on base rail. Locate spring clips at fascia cover laps and at mid-span of fascia cover.
- E. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.14 ANCHOR-TITE METAL

- A. Position the Sarnafil membrane over the roof edge and down outside face of wall covering wood nailer(s) completely, allowing ½ inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.
- B. Apply a 3/8 inch (10 mm) bead of Sarnafil sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).
- C. Fasten base rail into the side of the nailer at 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Anchor-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.
- D. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.15 COMPLETION

Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sarnafil prior to demobilization.

All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

3.18 DETAILS

See accompanying Sarnafil Detail Drawings.

Sarnafil has attempted to obtain information from the manufacturers of other products often used in conjunction with Sarnafil products with respect to the characteristics of such products, as well as their compatibility with Sarnafil's products. In as much as these other products as supplied in the field are subject to possible variation in their productions, and in as much as their specifications and performance characteristics are subject to change without notification by the manufacturers, Sarnafil expressly excludes from its warranty and responsibility for the performance or quality of the products of others used in conjunction with Sarnafil products. Sarnafil provides this specification as a guide only in technical support to architects or roof designers/specifiers. Sarnafil assumes no liability for error in design of or for misuse of this guide specification. The roof designer, engineer, architect or contractor must verify suitability of the specification and details.

MANUFACTURED COLLECTORS AND DOWNSPOUTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 1. Furnish and install collectors and downspouts as described in Contract Documents.
- B. Related Sections:
 1. Section 07 9213: Quality of sealants for joints.

1.2 REFERENCES

- A. Sheet Metal & Air Conditioning Contractors National Association Inc:
 1. SMACNA Architectural Sheet Metal Manual, 5th edition 1993.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel:
 1. Downspouts: Rectangular, 26 ga 0.478 mm galvanized steel including necessary elbows.
 2. Collectors: 24 ga 0.635 mm galvanized steel.
 3. Brackets: 22 ga 0.792 mm galvanized steel or 26 ga 0.478 mm double-hemmed minimum.
- B. Aluminum:
 1. Downspouts: Rectangular 0.032 inch 0.813 mm minimum aluminum including necessary elbows.
 2. Collectors: 0.050 inch 0.127 mm minimum aluminum.
 3. Brackets: 0.060 inch 0.152 mm minimum aluminum.
 4. Type Two Acceptable Manufacturers:
 - a. Copper Sales Inc, Minneapolis, MN (800) 426-7737 or (612) 576-9595. www.unaclad.com
 - b. Englert Inc, Perth Amboy, NJ (800) 610-1975 or (732) 826-8614. www.englertinc.com
 - c. Fabral, Jackson, GA (800) 884-4484. www.fabral.com
 - d. Integris Metals, Minneapolis, MN (800) 328-7800 or (763) 717-9000. www.integrismetals.com
 - e. Metal Sales Manufacturing Corp, Sellersburg, IN (800) 999-7777 or (812) 246-1866. www.mtlsales.com
 - f. Petersen Aluminum Corp, Elk Grove, IL (800) 323-1960 or (847) 228-7150. www.pac-clad.com
 - g. Reynolds Metals Company, Richmond, VA (800) 841-7774 or (804) 281-2636. www.rmc.com
 - h. Equal as approved by Architect before installation. See Section 01 6000.
- C. Screws, Bolts, Nails, And Accessory Fasteners: Non-corrosive and of strength and type consistent with function.
- D. Downspouts, collectors, brackets, fasteners, and accessories shall be compatible material.

2.2 FABRICATION

- A. Fabricate in accordance with SMACNA Manual recommendations, where applicable.
- B. Form accurately to details.
- C. Profiles, bends, and intersections shall be even and true to line.

2.3 FINISHES

- A. Metal exposed to view shall have face coating of polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
- B. Color as selected by Architect from Manufacturer's standard colors.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before starting work, verify governing dimensions at building. Inspect for conditions that would prevent installation of specified system. Do not install over improper conditions.

3.2 CLEANING

- A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

SECTION 07 9213

ELASTOMERIC JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
 - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Sections:
 - 1. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.
 - 2. Section 07 2419: Sealants for EIFS.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature and installation recommendations for each Product.
 - 2. Schedule showing joints requiring sealants. Show also backing and primer to be used.
- B. Quality Assurance / Control: Certificate from Manufacturer indicating date of manufacture.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
- B. Deliver and keep in original containers until ready for use.
- C. Do not use damaged or deteriorated materials.
- D. Store in a cool place, but never below 40 deg F 4 deg C.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sealants:
 - 1. Sealants provided shall meet Manufacturer's shelf-life requirements.
 - 2. Exterior Building Elements:
 - a. Joints and cracks around windows.
 - b. Aluminum entrance perimeters and thresholds.
 - c. Door frames.
 - d. Columns.
 - e. Louvers.
 - f. Wall penetrations.
 - g. Connections.
 - h. Parapet caps.
 - i. Other joints necessary to seal off building from outside air and moisture.
 - j. Category Four Approved Products. See Section 01 6000 for definitions of Categories.

- 1) Dow Corning:
 - a) Primer: 1200.
 - b) Sealant: 791.
 - 2) General Electric:
 - a) Primer: SS4044.
 - b) Sealant: Silpruf SCS 2000.
 - 3) Tremco:
 - a) Primer:
 - (1) Metal: No. 20.
 - (2) Other: No. 23.
 - b) Sealant: Spectrum 1.
 3. Exterior Sheet Metal And Miscellaneous:
 - a. Penetrations in soffits and fascias.
 - b. Roof vents and flues.
 - c. Flashings.
 - d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) 791 or 790 by Dow Corning.
 - 2) Sikaflex 15LM by Sika Corp.
 - 3) Tremsil 600 by Tremco.
 4. Exterior Concrete:
 - a. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) Joints between building foundations and exterior site concrete:
 - a) Dow Corning:
 - (1) Primer: 1200.
 - (2) Sealant: 790.
 - b) General Electric:
 - (1) Primer: SS4044.
 - (2) Sealant: Silpruf SCS 2000.
 - c) Tremco: Vulchem 45.
 - 2) Expansion joints in Portland cement concrete driveways and parking lots:
 - a) Dow Corning:
 - (1) Primer: 1200.
 - (2) Sealant: NS. SL may be used on non-sloping areas.
 - b) Tremco: Vulkem 45.
 5. Interior:
 - a. Inside jambs and heads of exterior door frames.
 - b. Inside perimeters of windows.
 - c. Miscellaneous gaps between substrates.
 - d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) Tub, Tile, And Ceramic Silicone Sealant by Dow Corning.
 - 2) Acrylic Latex 834 by Tremco.
 6. Interior At Exposed Masonry Walls:
 - a. Both sides of interior door frames.
 - b. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) Tub, Tile, And Ceramic Silicone Sealant by Dow Corning.
 - 2) Acrylic Latex 834 by Tremco.
 7. Interior Joints Formed By:
 - a. Countertops and backsplash to wall.
 - b. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) Tub, Tile, And Ceramic Silicone Sealant by Dow Corning.
 - 2) Acrylseal by General Electric.
 - 3) Tremsil 200 by Tremco.
 8. Color: As selected by Architect from Manufacturer's standard colors.
- B. Backing: Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.

2.2 MANUFACTURERS

- A. Contact Information:
 - 1. Dow Corning Corp, Midland, MI www.dowcorning.com.
 - 2. G E Silicone Products, Waterford, NY www.gesealants.com .
 - 3. Sika Corporation, Lyndhurst, NJ www.sika.com .
 - 4. Tremco, Cleveland, OH www.tremcosealants.com .

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surfaces shall be clean, dry, and free of dust, oil, grease, dew, or frost.
- B. Apply primer.
- C. Joint Backing:
 - 1. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than **3/8 inch 10 mm** deep.
 - 2. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.

3.2 APPLICATION

- A. Apply sealant with hand-calking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
- B. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
- C. Depth of sealant bite shall be **1/4 inch 6 mm** minimum and **1/2 inch 13 mm** maximum, but never more than one half or less than one fourth joint width.
- D. Do not apply calking at temperatures below **40 deg F 4 deg C**.
- E. Calk gaps between painted or coated substrates and unfinished or pre-finished substrates. Calk gaps larger than **3/16 inch 9 mm** between painted or coated substrates.

3.3 CLEANING

- A. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.

END OF SECTION

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DIVISION 08: OPENINGS

08 0000 OPENINGS

08 0601 HARDWARE GROUP AND KEYING SCHEDULES

08 1000 DOORS AND FRAMES

08 1213 STANDARD STEEL FRAMES

08 1429 PRE-FINISHED FLUSH WOOD DOORS / CLEAR

08 4000 ENTRANCES, STOREFRONTS, AND CURTAIN WALLS

08 4113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 5000 WINDOWS

08 5113 TICKET WINDOW

08 7000 HARDWARE

08 7101 COMMON DOOR HARDWARE REQUIREMENTS

08 7102 HANGING DEVICES

08 7103 SECURING DEVICES

08 7106 CLOSING DEVICES

08 7107 PROTECTIVE PLATES AND TRIM

08 7109 ACCESSORIES

08 8000 GLAZING

08 8100 GLASS GLAZING

08 9000 LOUVERS AND VENTS

08 9120 ARCHITECTURAL LOUVER

END OF TABLE OF CONTENTS

SECTION 08 0601

HARDWARE GROUP AND KEYING SCHEDULES

PART 1 - HARDWARE GROUP SCHEDULE for FINISH HARDWARE

1.1 DEFINITIONS

- A. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
1. F-75 Passage Latch: Latch bolt operated by knob / lever from either side at all times.
 2. F-76 Privacy Lock: Latch bolt operated by knob / lever from either side. Outside knob / lever locked by push button inside and unlocked by emergency key from outside or rotating knob / lever from inside.
 3. F-81 Office Door Lock: Dead locking latch bolt operated by knob / lever from either side, except when outside knob / lever is locked by turn button in inside knob/lever. When outside knob / lever is locked, latch bolt is operated by key in outside knob/lever or by rotating inside knob / lever. Turn button must be manually rotated to unlock outside knob / lever.
 4. F-84 Classroom Deadlock: Dead locking latch bolt operated by knob / lever from either side, except when outside knob / lever is locked, latch bolt is operated by key in outside knob / lever or by rotating inside knob / lever.
 5. F-86 Utility Space Door Lock: Dead locking latch bolt operated by key in outside knob / lever or by rotating inside knob / lever. Outside knob / lever is always fixed.
 6. F-91 Latch And Deadlocks: Dead locking latch bolt operated by key from both sides.
 7. E-2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown.
 8. E-2152 Deadbolt: Dead bolt operated by key from outside and turn button from inside. Bolt automatically dead locks when fully thrown.

1.2 SINGLE INTERIOR DOORS:

Group 23	
a. 3 each	Hinges.
b. One each	Lockset, Function F-81.
d. One each	Stop.
e. One each	Closer
g. One set	Smoke Gaskets.
Group 27	
a. 3 each	Hinges.
b. One each	Lockset, Function F-84.
c. One each	Closer.
d. One each	Stop.
e. One set	Smoke Gaskets.

FINISH HARDWARE KEYING SCHEDULE

1.3 INTERIOR DOORS

- A. Cores furnished and installed by Dixie State College:

END OF SECTION

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STANDARD STEEL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Hollow metal frames.
- B. Related Sections:
 - 1. Section 06 2024: Installation.
 - 2. Reposition of existing Aluminum Entry Frames.

1.2 REFERENCES

- A. Steel Door Institute / American National Standards Institute:
 - 1. SDI / ANSI A250.11-2002, 'Recommended Erection Instructions for Steel Frames.'

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Frames:
 - 1. Cold rolled furniture steel.
 - a. Interior Frames: 16 ga. 1.6 mm.
 - 2. Provide labeled frame to match fire rating of door.
 - 3. Finish:
 - a. Use one of following systems:
 - 1) Prime surfaces with rust inhibiting primer.
 - 2) Galvanize.
 - 4. Anchors: 16 US ga 1.6 mm minimum meeting UL or other code acceptable requirements for door rating involved.

2.2 MANUFACTURERS

- A. Category One Approved Manufacturers. See Section 01 6000 for definitions of Categories.
 - 1. Any current member of Steel Door Institute.

2.3 FABRICATION

- A. General Requirements:
 - 1. Frames shall be welded units. Provide temporary spreader on each welded frame.
 - 2. Provide Manufacturer's gauge label for each item.
 - 3. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
- B. Provide mortar guards at strikes and hinges.
- C. Anchors:

1. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.
2. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
3. Anchor types and configurations shall meet wall conditions.

PART 3 - EXECUTION

3.1 SUPPLIERS

- A. Suppliers. See Section 01 6000 for definitions of Categories.
 1. Architectural Building Supply, Salt Lake City, UT Russ Farley, Phone (800) 574-4369 FAX 801-484-6817, e-mail absslc@absdoors.com.
 2. Beacon Metals Inc, Salt Lake City, UT Chad Riches, Phone (888) 823-2206 FAX 801-485-7647, e-mail, chadr@beacon-metals.com.
 3. Or equal prior to bidding.

END OF SECTION

PRE-FINISHED FLUSH WOOD DOORS / Clear

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Factory-finished flush wood doors.
- B. Related Sections:
 - 1. Section 06 2024: Installation.
 - 2. Section 06 4114: Architectural woodwork doors.

1.2 REFERENCES

- A. Architectural Woodwork Institute:
 - 1. AWI Standards, 'Architectural Woodwork Quality Standards, 7th Edition.'
- B. Composite Panel Association / American National Standards Institute:
 - 1. CPA / ANSI A208.1-1999, 'Particleboard, Mat-Formed Wood.'
- C. Hardwood Plywood & Veneer Association / American National Standards Institute:
 - 1. HPVA / ANSI HP-1-2004, 'Hardwood and Decorative Plywood.'
- D. National Fire Protection Association / American National Standards Institute:
 - 1. NFPA / ANSI 80-1998, 'Fire Doors and Fire Windows.'

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product literature on doors and factory finish.
 - 2. Maintenance and repair instructions.
- B. Shop Drawings:
 - 1. Schedule showing type of door at each location. Included shall be size, veneer, core type, fire rating, hardware prep, openings, blocking, etc.
 - 2. Indicate factory finish color and type.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in clean truck and, in wet weather, under cover.
 - 1. Deliver to building site only after plaster, cement, and taping compound are completed and dry and after interior painting operations have been completed.
 - 2. Individually wrap in polyethylene bags for shipment and storage. Leave shipping bag on door after installation until immediately before substantial completion inspection.
- B. Store doors in a space having controlled temperature and humidity range between 25 and 55 percent. Store flat on level surface in dry, well ventilated space. Cover to keep clean but allow air circulation. Do not subject doors to direct sunlight, abnormal heat, dryness, or humidity.
- C. Handle with clean gloves and do not drag doors across one another or across other surfaces.

1.5 WARRANTY

- A. Manufacturer's standard full door warranty for lifetime of original installation.
 - 1. Warranty shall include finishing, hanging, and installing hardware if manufacturing defect was discovered after door was finished and installed.
 - 2. Warranty to include defects in materials including following:
 - a. Delaminating in any degree.
 - b. Warp or twist of 1/4 inch 6 mm or more in door panel at time of one-year warranty inspection.
 - c. Telegraphing of core assembly: Variation of 1/100 inch 0.25 mm or more in 3 inch 75 mm span.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Wood Doors:
 - 1. Type: AWI PC-5ME or FD-5ME.
 - 2. Grade: AWI Premium, except face veneer.
 - 3. Fully Type I Construction: Adhere all glue lines with Type I adhesive, including veneer lay-up.
 - 4. Face Veneer:
 - a. Match existing concourse wood door species and color.
 - 5. Core:
 - a. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
 - b. Non-Rated And Fire-Rated, AWI FD 1/3:
 - 1) 32 lb density meeting requirements of ANSI A 208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
 - 2) Stiles:
 - a) 1-3/8 inches 35 mm deep minimum before fitting.
 - b) Stile face to be hardwood matching face veneer material, thickness manufacturer's standard.
 - 3) Rails:
 - a) 1-1/8 inches 28 mm.
 - b) Manufacturer's option.
 - 6. Factory Finishing:
 - a. Applied by Door Manufacturer before leaving factory.
 - b. Color: To match existing doors.
 - c. Finish: AWI Finish System TR-6 Catalyzed Polyurethane Premium Grade for unfilled, open-grain woods.

2.2 MANUFACTURERS

- A. Category Four Approved Manufacturers. See Section 01 6000 for definitions of Categories.
 - 1. Oshkosh Architectural Door, Oshkosh, WI.
 - 2. VT Industries, Holstein, IA.
 - 3. Marshfield Door Systems Inc, Marshfield, WI.

2.3 FABRICATION

- A. Doors shall be factory-machined. Coordinate with Section 08 1213 and Sections under 08 7000.

2.4 SOURCE QUALITY CONTROL

- A. Verification of Performance:

1. Doors shall have following information permanently affixed on top of door:
 - a. Manufacturer:
 - b. Door designation or model.
 - c. Veneer species.
 - d. Factory finish.

PART 3 - EXECUTION

3.1 SUPPLIERS

- A. Suppliers. See Section 01 6000 for definitions of Categories.
 1. Architectural Building Supply, Salt Lake City, UT Russ Farley Phone (800) 574-4369 FAX 801-484-6817 e-mail absslc@absdoors.com.
 2. Beacon Metals Inc, Salt Lake City, UT Chad Riches Phone (888) 823-2206 FAX 801-485-7647 e-mail chadr@beacon-metals.com.
 3. Or equal prior to bidding.

END OF SECTION

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SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Reglazing existing exterior storefront and doors with insulated glazing replacing the existing single pane glazing.
 - 2. Relocating selected storefront to new openings.
- B. Related Sections:
 - 1. Section 07 9213: Quality of sealants.
 - 2. Section 08 8100: Quality of glass glazing.

1.2 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Frames: (All Existing)
- B. Manually Operated Doors: (All Existing)
- C. Glazing Characteristics
 - 1. Storefront Doors And Sidelights: Clear interior pane and Clear exterior pane with Low E treatment on surface 2.
- D. Approved Manufacturers. See Section 01 6000 for definitions of Categories.
 - 1. Kawneer, Norcross, GA Paul Cannon (801) 201-1080, FAX 801-768-4588
paul.cannon@kawneer.com.
 - 2. Vistawall, Terrell, TX Kent Baumann (800) 869-4567 ext 386, FAX 972-551-6264
kbaumann@vistawall.com.
 - 3. Or equal prior to bidding.

2.2 STOREFRONT HARDWARE (All Existing)

2.3 STOREFRONT GLAZING STOP AND GASKETING

- A. Provide and install new aluminum stop and proper gasketing to receive new insulated glazing. Match existing finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification Of Conditions: Verify that existing openings will accommodate new insulated glazing.

3.2 INSTALLATION

- A. Relocated storefront to be set plumb, square, level, and in correct alignment and securely anchor. If used, line up horizontal rail in sidelight with door rail.
- B. Adjust doors for proper operation after glazing door and storefront. Calk joints between frames and walls, both interior and exterior. Remove all old caulk and replace with new including backer rod.

3.3 FIELD QUALITY CONTROL

- A. Site Tests: Pull test doors, especially pairs of single doors separated by permanent mullions, to ensure security of opening.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Install window units as described in Contract Documents.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature or cut sheet.
 - 2. Literature on glazing.
 - 3. Color and finish selection.
- B. Quality Assurance / Control:
 - 1. Manufacturer's published installation instructions for windows, flashing, and sealants.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Ticket:
 - 1. Custom sized 24" x 48" stationary window similar to stock number SCW 102 by Nissen and Company Inc. 9508 E. Rush Street, South Elmonte, CA 91733-1574. 323-723-3636/ 626-579-5666 / Fax 626-579-0628.
 - 2. Glazing ¼" clear tempered glass.
 - 3. Counter: Stainless steel 24" x 18".
 - 4. Ticket window access door model 724, clear aluminum.
 - 5. Speak Hole: Model 415
 - 6. Electronic talk through speak hole model NIS-IA.

2.2 SOURCE QUALITY CONTROL

- A. When delivered to Project site, windows shall bear permanent label stating model of window and Manufacturer's name, or AAMA label.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set window frame plumb, level, and in alignment. Secure window properly in opening.
- B. Apply specified sealant between window frame and building wall at building interior. Trim off excess sealant.

- C. Avoid direct contact between aluminum and adjacent steel work by insulating with materials equal to 3M's EC 1202 tape, if materials are in pressure contact, or with bituminous paint, if pressure between surfaces cannot be maintained.

3.2 FIELD QUALITY CONTROL

- A. Inspections:
 - 1. Notify Architect when windows are to be delivered to Project site to allow opportunity for Architect's inspection before installation.

3.3 ADJUSTING

- A. After windows are in place, installer shall adjust hardware and ventilators to operate smoothly and be weather tight when closed.

3.4 CLEANING

- A. After installation, clean interior and exterior metal surfaces of windows and accessories of mortar, plaster, paint, and other contaminants. Maintain protection and provide final cleaning.

END OF SECTION

SECTION 08 7101

COMMON HARDWARE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. General requirements for finish hardware related to architectural wood doors.
- B. Related Sections:
 - 1. Section 06 2024: Installation.
 - 2. Section 06 4124: Architectural woodwork hardware.
 - 3. Section 08 0601: Hardware Group Schedules.

1.2 QUALITY ASSURANCE

- A. Suppliers bidding this work shall have two years minimum experience in providing, detailing, scheduling, and installing builders hardware and shall employ at least one full time DHI Architectural Hardware Consultant (AHC).

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

PART 2 - PRODUCTS

2.1 FINISHES

- A. Finishes for steel, brass, or bronze hardware items shall be US26D, Chromium plated, satin, except flat goods which may be US32D, stainless steel, satin. Materials other than steel, brass, or bronze shall be finished to match the appearance of US26D / 32D.

2.2 FASTENERS

- A. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware. Fasteners shall be of same material and finish as hardware unless otherwise specified. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.

PART 3 - EXECUTION

3.1 SUPPLIERS

- A. Category One Approved VMR Suppliers. See Section 01 6000 for definitions of Categories.
 - 1. Architectural Building Supply, Salt Lake City, UT Russ Farley, Phone (800) 574-4369, FAX 801-484-6817, e-mail abssl@absdoors.com.

2. Beacon Metals Inc, Salt Lake City, UT Chad Riches, Phone (888) 823-2206, FAX 801-485-764, e-mail chadr@beacon-metals.com.
3. Or approved equal prior to bidding.

3.2 PREPARATION

- A. Before ordering materials, examine documents to be assured that material to be ordered is appropriate for substrate to which it is to be secured and will function as intended.

END OF SECTION

SECTION 08 7102

HANGING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Hinges for flush wood.
- B. Related Sections:
 - 1. Section 08 7101: Common Hardware Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Hinges:
 - 1. Sizes:
 - a. 1-3/4 inch 45 mm doors and fire-rated doors in metal frames:
 - 1) Standard: 4-1/2 inches by 4-1/2 inches 113 mm by 113 mm.
 - 2) Wide Throw: 4-1/2 inches 113 mm by width required.
 - b. 1-3/4 inch 44.5 mm non-fire-rated wood doors in wood frames: 4 inches by 4 inches 100 mm by 100 mm.
 - c. 1-3/8 inch 35 mm wood or metal doors: 3-1/2 inches by 3-1/2 inches 89 mm by 89 mm.
 - 2. Use non-removable pins on exterior opening doors.
 - 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
 - 4. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - a. Interior:
 - 1) Hager: BB 1279.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2714.
 - 4) MacPro / McKinney: MPB79
 - 5) PBB: BB81.
 - 6) Stanley: FBB 179.

2.2 MANUFACTURERS

- A. Approved Manufacturers:
 - 1. Hager Companies, St Louis, MO www.hagerhinge.com.
 - 2. Ives, New Haven, CT www.iveshardware.com.
 - 3. McKinney, Scranton, PA www.mckinneyhinge.com.
 - 4. PBB, Ontario, CA www.pbbinc.com.
 - 5. Stanley, New Britain, CT www.stanleyworks.com.

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 08 7103
SECURING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Items for architectural wood or hollow metal doors:
 - a. Locksets and latchsets.
- B. Related Sections:
 - 1. Section 08 0601: Hardware Group.
 - 2. Section 08 7101: Common Hardware Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. General:
 - 1. Backsets shall be 2-3/4 inches 70 mm.
 - 2. Furnish lead shields where required.
- B. Locksets And Latchsets:
 - 1. Lever Operated:
 - a. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1) CL3300 Series by Corbin Russwin.
 - 2) Or equal prior to bidding.

2.2 MANUFACTURERS

- A. Contact Information:
 - 1. Corbin Russwin, Berlin, CT www.yalesecurity.com.

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 08 7106

CLOSING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Closers for flush wood doors.
- B. Related Sections
 - 1. Section 08 7101: Common Hardware Requirements:

1.2 WARRANTY

- A. Provide Manufacturer's standard warranty, 5 years minimum.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Surface-Mounted Overhead Door Closers:
 - 1. Closers provided under this Section shall be from same Manufacturer.
 - 2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
 - 3. Closers shall allow for 180 degree opening and not be used as a stop.
 - 4. Closers shall have following features:
 - a. Adjustable sweep speed.
 - b. Adjustable backcheck.
 - c. Non-handed, non-sized.
 - d. Delayed action closing where noted on Door Schedule.
 - 5. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - a. 7900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
 - b. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
 - c. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoorcontrols.com.
 - d. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount closers on stop side of door wherever conditions permit.
- B. Through-bolt hardware-to-door connections.

3.2 ADJUSTING

- A. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

END OF SECTION

SECTION 08 7107

PROTECTIVE PLATES AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Kick plates.
- B. Related Sections:
 - 1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Kick Plates:
 - 1. Material: 0.050 inch 1.3 mm thick Stainless Steel.
 - 2. Sizes: 10 inches 250 mm high by width of door less 3/4 inch 19 mm on each side.
 - 3. Type Two Acceptable Manufacturers:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 www.hagerhinge.com.
 - c. Ives, Wallingford, CT www.iveshardware.com.
 - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - e. Equal as approved by Architect before installation. See Section 01 6000.

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 08 7109

ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section:
 - 1. Smoke gaskets.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Smoke Gaskets:
 - 1. Color as selected by Architect.
 - 2. Type One Acceptable Products:
 - a. 726 by Hager.
 - b. 5050 by NGP.
 - c. PK55 by Pemko.
 - d. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 MANUFACTURERS

- A. Contact Information:
 - 1. Hager, St Louis, MO www.hagerhinge.com.
 - 2. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
 - 3. Pemko, Ventura, CA www.pemko.com.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install smoke gaskets and acoustical seals in manner to give continuous air-tight fit.
 - 1. Install smoke gaskets in 'wipe seal' configuration.

END OF SECTION

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SECTION 08 8100

GLASS GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of glazing used in entries and windows.
- B. Related Sections:
 - 1. Section 08 4113: Furnishing and installing of glazing in aluminum-framed storefront.
 - 2. Section 08 5113 or 08 5313: Furnishing and installing of glazing in windows.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 1036-01, 'Standard Specification For Flat Glass.'
 - 2. ASTM C 1048-04, 'Standard Specification For Heat-Treated Flat Glass - Kind H, Kind FT Coated and Uncoated Glass.'
 - 3. ASTM E 774-97, 'Standard Specification for Sealed Insulating Glass Units.'

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Glazing shall meet applicable requirements of Federal Consumer Product Safety Standard 16CFR1201.
- B. Manufacturer's Labels: Labels showing strength, grade, thickness, type, and quality are required on each piece of glass.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Storefront Insulated Glazing:
 - 1. Thickness: 1/4 inch 6 mm.
 - 2. Glazing shall have following characteristics:
 - a. Clear: ASTM C 1036, Type I, Class I, Quality q3.
 - b. Pyrolytic Low E:
 - 1) Performance Standard: Energy Advantage Clear by LOF.
 - 2) Type One Acceptable Manufacturers:
 - a) AFG
 - b) LOF
 - c) PPG
 - d) Visteon.
 - e) Equal as approved by Architect before bidding. See Section 01 6000.
 - c. All glazing shall be tempered meeting requirements of ASTM C 1048, Kind FT, Condition A, Type I, Class I, Quality q3.

2.2 MANUFACTURERS

- A. Contact Information for Low E Glazing Manufacturers:
1. AFG Industries, Kingsport, TN www.afg.com.
 2. Pilkington Libby-Owens-Ford - LOF, Toledo, OH www.pilkington.com.
 3. PPG Industries, Pittsburgh, PA www.ppgglass.com.
 4. Visteon, Allen Park, MI www.visteon.com/floatglass/

2.3 FABRICATION

- A. Except where glass exceeds **66 inches** **1 650 mm** in width, cut clear glass so any wave will run horizontally when glazed.
- B. Sealed, Insulating Glazing Units:
1. Double pane, sealed insulating glass units meeting requirements of ASTM E 774, Class A. Install in existing exterior aluminum-framed storefront.
 2. Unit Thickness: **5/8 inch** **16 mm** minimum, **one inch** **25 mm** maximum. Verify to fit in existing storefront and with newly added glazing stops and gaskets.
 3. Type Seal:
 - a. Metal-to-glass bond and separated by **1/2 inch** **13 mm** dehydrated air space.
 - b. Use non-hardening sealants.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 9120

ARCHITECTURAL LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes pre -finished architectural louver extruded aluminum blades. Type K 609 as designed and manufactured by the Airolite Company LLC, Marietta, Ohio. Louvers shall be furnished with supports, and installation hardware.

1.2 SUBMITTALS

- A. Furnish shop drawings showing attachments, louver profile, dimensions, and support standards.

PART 2 - PRODUCTS

- A. Louver shall be architectural blade louver Type K 609 horizontal blades, 4" unit. Blades to be 0.081 inches thick extruded aluminum alloy 6063-T5. Blades shall be stationary, horizontal and spaced 5" on center.
- B. Structural design criteria: Manufacturer shall design and furnish all supports required to withstand a wind force of not less than 25 pounds per square foot (100 m.p.h.)
- C. Finish shall be finished- after- assemble with a class 1 clear anodized coating. (AA- M10CZZA41) that complies with the performance requirements of AAMA specification 611-98.

PART 3 - EXECUTION:

A. INSTALLATION

- 1. Install per manufacturer recommendations.

END OF SECTION

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DIVISION 09: FINISHES

09 2000 PLASTER AND GYPSUM BOARD

09 2216 NON-STRUCTURAL METAL FRAMING
09 2900 GYPSUM BOARD

09 5000 CEILINGS

09 5113 ACOUSTICAL PANEL CEILINGS

09 6000 FLOORING

09 6513 RESILIENT BASE AND ACCESSORIES
09 6813 TILE CARPETING

09 9000 PAINTS AND COATINGS

09 9001 COMMON PAINTING AND COATING REQUIREMENTS
09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER
09 9124 INTERIOR PAINTED METAL

END OF TABLE OF CONTENTS

SECTION 09 2216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install metal framing systems and blocking as described in Contract Documents.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM C 645-04, 'Standard Specification for Nonstructural Steel Framing Members.'

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Framing:
 - 1. 20 ga 0.95 mm minimum, unless noted greater on Drawings, meeting requirements of ASTM C 645.
 - 2. Tracks, bridging, blocking, strapping, and other accessories shall be as described in Contract Documents or as required by Manufacturer's system.
 - 3. Type One Approved Products:
 - a. 3-5/8 IC 20 ga by American Studco and 6" 20 ga.
 - b. 362DS20P by CEMCO.
 - c. Drywall Metal, 20 ga only, by Clark Western.
 - d. 20 Ga STE by Dietrich Industries.
 - e. 20 Ga 3-5/8 SS Series by Steeler Inc.
 - f. Any member of Steel Stud Manufacturer's Association (SSMA).
 - g. Equal as approved by Architect before bidding. See Section 01 6000.
- B. Sheet Steel: 18 ga 1.3 mm hot-dipped galvanized sheet steel.
- C. Sill Sealer: Closed-cell polyethylene foam, 1/4 inch 6 mm thick by width of plate.

2.2 MANUFACTURERS

- A. Type One Acceptable Manufacturers:
 - 1. Allied Studco Inc, Phoenix, AZ www.studco.com.
 - 2. CEMCO, City of Industry, CA www.cemcosteel.com.
 - 3. Clark Western, Cincinnati, OH www.clarksteel.com.
 - 4. Dietrich Industries Inc, Pittsburgh, PA www.dietrichindustries.com.
 - 5. Steeler Inc, Seattle, WA www.steeler.com.
 - 6. Equal as approved by Architect before bidding. See Section 01 6000.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are required by Contract Documents.
- B. Interface With Other Work:
 - 1. Coordinate with other Sections to provide blocking necessary for their work.
 - 2. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties.
- C. Wall Tolerances:
 - 1. 1/4 inch 6 mm in 20 feet 6 meters, non-cumulative in length of wall.
 - 2. 1/8 inch 3 mm in 10 feet 3 meters with 1/4 inch 6 mm maximum in height of wall.
 - 3. Distances between parallel walls shall be 1/4 inch 6 mm maximum along length and height of wall.
- D. Framing:
 - 1. Install specified sill sealer under sill plates of exterior walls and of acoustically insulated interior walls.
 - 2. Apply double framing members at openings. Wrap multiple, adjacent framing members with duct tape or otherwise secure to eliminate 'chattering.'
 - 3. Use grommets at framing penetrations where unsecured items pass through.

END OF SECTION

SECTION 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install interior and exterior gypsum board as described in Contract Documents.
 - 2. Furnish and install acoustical sealants as described in Contract Documents.
- B. Related Sections:
 - 1. Section 07 9219: Quality of acoustical sealants.
 - 2. Section 09 9413: Textured finishing

1.2 REFERENCES

- A. Gypsum Association:
 - 1. GA-214-90: 'Recommended Specification: Levels of Gypsum Board Finish.'
- B. American Society For Testing And Materials:
 - 1. ASTM C 36-03, 'Standard Specification for Gypsum Wallboard.'
 - 2. ASTM C 475-02, 'Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.'
 - 3. ASTM C 840-01, 'Standard Specification for Application and Finishing of Gypsum Board.'
 - 4. ASTM C 931-02, 'Standard Specification for Exterior Gypsum Soffit Board.'
 - 5. ASTM C 1002-01, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panels or Metal Plaster Bases to Wood Studs or Steel Studs.'
 - 6. ASTM C 1396-04, 'Standard Specification for Gypsum Board.'

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- B. Store material under roof and keep dry. Stack gypsum board flat and protect from damage.

1.4 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Temperature shall be 50 deg F 10 deg C and 95 deg F 35 deg C maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2. Provide ventilation to eliminate excessive moisture.
 - 3. Avoid hot air drafts that will cause too rapid drying.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Interior Gypsum Board:
 - 1. Fire-Rated Construction:

- a. Class Two Quality Standard: Product meeting requirements of ASTM C 36 or C 1396, Type X, UL one-hour rated, tapered edge, face paper suitable for painting.
 2. Non-Fire-Rated Construction:
 - a. Class Two Quality Standard: Product meeting requirements of ASTM C 36 or C 1396. Board installed in areas accessible to public shall have tapered edge to accommodate taping and face paper suitable for painting.
- B. Corner And Edge Trim:
 1. Metal: 24 ga 0.635 mm minimum steel, electrolytic galvanized zinc-coated, treated for maximum cement and paint adhesion. Surfaces to receive bedding cement knurled for maximum bonding.
 2. Paper-Faced Metal:
 - a. Type Two Acceptable Products:
 - 1) Beadex Drywall Accessories.
 - 2) Chicago Metallic.
 - 3) Goldline Drywall Trim by Unimast.
 - 4) USG.
 - 5) Equal as approved by Architect before installation. See Section 01 6000.
 3. Paper-Faced Plastic:
 - a. Type One Acceptable Products:
 - 1) No-Coat by Drywall Systems International.
 - 2) Equal as approved by Architect before bidding. See Section 01 6000.
 4. Solid Vinyl: May be used on curved portions of arches and similar decorative features.
- C. Joint Compound:
 1. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C 475.
 - a. Use Taping Compound for first coat to embed tape and accessories.
 - b. Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
 - c. Use Finishing Compound for final coat and for skim coat.
 - d. Joint Reinforcing: Paper reinforcing tape acceptable to Board Manufacturer.
- D. Primer / Surfacers Under Surfaces To Receive Texturing:
 1. Type Two Acceptable Products:
 - a. Sheetrock First Coat by USG.
 - b. Prep Coat Plus by Hamilton Materials.
 - c. ProForm Surfacers / Primer by National Gypsum.
 - d. Level Coat by Magnum Products.
 - e. Equal as approved by Architect before bidding. See Section 01 6000.
- E. Fasteners:
 1. Bugle head screws meeting requirements of ASTM C 1002.
 - a. Types:
 - 1) Type S: For fastening gypsum board to steel framing and ceiling suspension members.
 - b. Lengths:
 - 1) Of length to penetrate steel framing 3/8 inch 10 mm minimum.

2.2 MANUFACTURERS

- A. Contact Information:
 1. Beadex Drywall Accessories, Auburn, WA www.usg.com.
 2. Chicago Metallic, Chicago, IL www.chicago-metallic.com.
 3. Drywall Systems International, Bend, OR www.no-coat.com.
 4. Georgia Pacific, Atlanta, GA www.gp.com.
 5. Hamilton Materials Inc, Orange, CA www.hamiltonmaterials.com.
 6. Magnum Products, Lenexa, KS www.levelcoat.com.
 7. National Gypsum, Charlotte, NC www.national-gypsum.com.
 8. United States Gypsum Co, Chicago, IL www.usg.com.
 9. Wm. Zinsser & Co, Somerset, NJ www.zinsser.com.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C 840 unless specified otherwise in this Section.
- C. Interior Gypsum Board:
 - 1. General:
 - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over **1/8 inch 3 mm** wide before taping are acceptable.
 - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
 - 2. Single Layer Application:
 - a. Use board of length to give minimum number of joints.
 - b. On walls over **108 inches 2 700 mm** high and on ceilings, apply board perpendicular to support.
 - c. Stagger end joints. End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with **2x4 38 mm by 89 mm** blocking. End joints of board horizontally applied on walls shall occur over framing members. Edge joints of board vertically applied on walls shall occur over framing members.
 - d. Butt edges in moderate contact. Do not force in place. Shim to level.
 - e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - f. Scribe work closely. Keep joints as far from openings as possible. If joints occur near an opening, apply board so vertical joints are centered over openings. No vertical joints shall occur within **8 inches 200 mm** of external corners or openings.
 - g. Install board tight against support with joints even and true. Tighten loose screws.
 - h. Calk perimeter joints in sound insulated rooms with specified acoustical sealant.
 - 3. Fastening:
 - a. Apply from center of board towards ends and edges.
 - b. Apply screws **3/8 inch 10 mm** minimum from ends and edges, **one inch 25 mm** maximum from edges, and **1/2 inch 13 mm** maximum from ends.
 - c. Spacing:
 - 1) Ends: Screws not over **7 inches 175 mm** on center at edges where blocking or framing occurs.
 - 2) Metal Framed Walls: Screws **12 inches 300 mm** on center in panel field.
 - d. Set screw heads **1/32 inch 0.8 mm** below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw **2 inches 50 mm** away.
 - e. Screws on adjacent ends or edges shall be opposite each other.
 - f. Drive screws with shank perpendicular to face of board.
 - 4. Trim:
 - a. Corner Beads:
 - 1) Attach corner beads to outside corners.
 - a) Attach metal corner bead with staples spaced **4 inches 100 mm** on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
 - b) Set paper-faced trim in solid bed of taping compound.
 - b. Edge Trim: Apply where gypsum board abuts dissimilar material in accordance with Manufacturer's instructions. Hold channel and 'L' trim back from exterior metal window and metal door frames **1/8 inch 3 mm** to allow for calking.
 - 5. Finishing:
 - a. General:

- 1) Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - 2) First Coat:
 - a) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
 - b) Completely fill gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - 3) Second Coat:
 - a) Apply coat of specified joint compound over embedded tape extending **3-1/2 inches 88 mm** on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - b) Re-coat gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - 4) Third Coat: Apply same as second coat except extend application **6 inches 150 mm** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - 5) Fourth Coat: Apply same as second coat except extend application **9 inches 425 mm** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
- b. Finishing Levels:
- 1) Vertical Gypsum Board Surfaces not painted or finished:
 - a) GA-214-96 Level One: Joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

3.2 CLEANING

- A. Remove from site debris resulting from work of this Section including taping compound spills.

END OF SECTION

SECTION 09 5113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install acoustical ceiling panels for suspended acoustical ceilings as described in Contract Documents.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature.
 - 2. Color and pattern selection.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store materials where protected from moisture and damage.
- B. Use no soiled, scratched, or broken material in the Work.

1.4 PROJECT CONDITIONS

- A. Project Environmental Requirements: Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.

1.5 MAINTENANCE

- A. Extra Materials:
 - 1. Other Projects: Provide Owner with one carton of each type of tile for future use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acoustic Panels:
 - 1. Finish: Abuse-resistant / durable. Use tile from same color run in individual rooms to assure color match.
 - 2. Rating: Match UL fire-resistance classification of suspension system.
 - 3. Thickness: 3/4 inch 19 mm minimum.
 - 4. Category Four Acceptable Manufacturers.
 - a. Armstrong.
 - b. BPB Celotex.
 - c. Eurostone by Chicago Metallic.
 - d. USG.

2.2 MANUFACTURERS

A. Contact Information:

1. Armstrong World Industries Co, Lancaster, PA www.ceilings.com.
2. BPB Celotex, Tampa, FL www.bpb-na.com.
3. Eurostone by Chicago Metallic Corp, Chicago, IL www.chicago-metallic.com.
4. USG Interiors Inc, Chicago, IL www.usg.com.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect for defects in support that are not acceptable. Report defects to Architect in writing. Do not install ceiling panels until defects in support are corrected.

3.2 INSTALLATION

- A. Materials shall be dry and clean at time of application.
- B. If recommended by Manufacturer, use tile one at a time from at least four open boxes to avoid creating any pattern due to slight variations from box to box.
- C. Leave tile in true plane with straight, even joints.

3.3 ADJUSTING

- A. 'Touch-up' minor abraded surfaces.
- B. Remove and replace discolored panels to match adjacent panels.
- C. Remove and replace damaged panels at no additional cost to Owner.

3.4 CLEANING

- A. Remove from site all debris connected with work of this Section.

END OF SECTION

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install rubber base as described in Contract Documents.
 - 2. Furnishing and installing molded rubber stair skirts as described in Contract Documents.
 - 3. Furnish and install rubber stair treads and risers as described in Contract Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM F 1861-02, 'Standard Specification for Resilient Wall Base.'

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature or cut sheet on base and adhesive.
 - 2. Color selection.

1.4 PROJECT CONDITIONS

- A. Project Environmental Requirements:
 - 1. Store materials at not less than 70 deg F 21 deg C for at least 24 hours before using.
 - 2. Do not apply in temperatures below 70 deg F 21 deg C.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. General:
 - 1. Molded or extruded meeting requirements of ASTM F 1861, Type TP:
 - a. Thermoplastic rubber, free from objectionable odors, blisters, cracks, and other defects affecting appearance or serviceability of rubber, and not containing fabric.
 - b. Color pigments used shall be highly fade-resistant, insoluble in water, and resistant to light, alkali, and cleaning agents.
 - c. Colors as selected by Architect from Manufacturer's standard colors.
- B. Base:
 - 1. Size: 1/8 inch by 4 inch 3 mm by 100 mm.
 - 2. Use preformed, molded external corners. Butt joint interior corners.
 - 3. Style: Coved.
- C. Stair Skirts: Cut from 1/8 inch by 10 inch by 36 inch 3 mm by 250 mm by 900 mm stock to contour and profile of stairs.
- D. Adhesive: Best for work as recommended by Manufacturer.

- E. Category Four Approved Manufacturers. See Section 01 6000 for definitions of Categories.
 - 1. American Floor Products Co Inc (AFCO-USA), Gaithersburg, MD www.afco-usa.com.
 - 2. Burke Mercer Flooring Products, San Jose, CA www.burkemercer.com.
 - 3. Johnsonite Flooring Products Div, Chagrin Falls, OH www.johnsonite.com.
 - 4. Flexco by ESD Flooring Systems, Tuscumbia, AL www.marleyflexco.com.
 - 5. PRF USA Inc, Carlstadt, NJ www.rubberfloors.com.
 - 6. Roppe Rubber Corporation, Fostoria, OH www.roppe.com.
 - 7. Vinyl Plastics Inc VPI, Sheboygan, WI www.vpicorp.com.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect surfaces for conditions not suitable for installation. Surface to receive specified items shall be sound, clean, free from foreign matter, tightly nailed, and dry. Do not start work until defects are corrected.

3.2 PREPARATION

- A. Remedy cracks and minor irregularities in substrate in accordance with Manufacturer's recommendations.

3.3 INSTALLATION

- A. Install in manner to produce smooth, even finished surfaces tightly jointed and accurately aligned.
- B. Fit specified items tightly. Use fillers where necessary. Fit neatly against projections, piping, electrical service outlets, etc.
- C. Secure specified items with specified adhesive. Cement substantially to vertical surfaces including rubber base to cabinet work base.
- D. Line up top and bottom lines of base throughout.
- E. Roll until firm bond has been established. Leave level, free from buckles, cracks, and projecting edges.
- F. In wall runs longer than 12 inches 300 mm, install no lengths of base shorter than 12 inches 300 mm long.

3.4 ADJUSTING

- A. Inspect and make necessary adjustments within one month after mechanical heat or other heat has been supplied continuously in finished areas.

3.5 PROTECTION

- A. Keep traffic away until adhesive has set.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Work:
 - 1. Carpet tiles are excluded from Contract and provided and installed by Owner. This specification establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature.
 - 2. Color and style selection.

1.3 MAINTENANCE

- A. Extra Materials: Leave carpet tiles equivalent to 15 percent of number installed as attic stock. Tie securely and wrap in protective cover.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Carpet:
 - 1. Selected by Owner.
- B. Trim: Provide trim around unrestrained edges of carpet tiles.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Floor Preparation: Prepare floor substrate in accordance with Carpet And Rug Institute (CRI) best practices to receive carpet installation and to provide installation that meets Carpet Manufacturer's warranty requirements.

END OF SECTION

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SECTION 09 9001

COMMON PAINTING AND COATING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common procedures and requirements for field-applied painting and coating.
- B. Related Sections:
 - 1. Section 05 0503: Quality of shop priming of steel and iron.
 - 2. Section 09 2900: Priming of gypsum board before texturing.
 - 3. Section 09 9413: Textured finishing.
 - 4. Divisions 22 and 23: Painting of plumbing identification.

1.2 REFERENCES

- A. Master Painters Institute:
 - 1. MPI(a), Mar 2001, 'Architectural Painting Specification Manual.'

1.3 DEFINITIONS

- A. Gloss Levels:
 - 1. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.

Gloss Level '1'	Traditional matte finish - flat	0 to 5 units at 60 degrees to 10 units maximum at 85 degrees.
Gloss Level '2'	High side sheen flat - 'velvet-like' finish	10 units maximum at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '3'	Traditional 'eggshell-like' finish	10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '4'	'Satin-like' finish	20 to 35 units at 60 degrees and 35 units minimum at 85 degrees.
Gloss Level '5'	Traditional semi-gloss	35 to 70 units at 60 degrees.
Gloss Level '6'	Traditional gloss	70 to 85 units at 60 degrees.
Gloss Level '7'	High gloss	More than 85 units at 60 degrees.

- B. Properly Painted Surface: Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).
- C. Damage Caused By Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
- D. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

1.4 SUBMITTALS

- A. Samples: Provide two 4 inch by 6 inch 100 by 150 mm minimum draw-down cards for each paint or coating color selected for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container. Deliver amount of materials necessary to meet Project requirements in single shipment. Notify Architect two working days before delivery of paint.
- B. Store materials in single place.
- C. Keep storage area clean and rectify any damage to area at completion of work of this Section. Maintain storage area at 55 deg F 13 deg C minimum.

1.6 PROJECT CONDITIONS

- A. Project Environmental Conditions:
 - 1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product.
 - 2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted. Inspection of painting work shall take place under same lighting conditions as application. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92

1.7 SCHEDULING

- A. Coordinate with other trades for materials and systems that require painting before installation.
- B. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.

1.8 MAINTENANCE

- A. Extra Materials: Provide painting materials in Manufacturer's original containers and with original labels in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life. Provide one quart of each finish coat and one pint of each primer and of each undercoat in each color used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturer. Include such approvals in Product Data submittal.
- B. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Instructions to applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.
- B. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.
- C. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

3.2 PREPARATION

- A. Protection:
 - 1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 - 2. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
- B. Surface Preparation:
 - 1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
 - 2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
 - 3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
 - 4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
 - 5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

3.3 APPLICATION

- A. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
 - a. Electrical panel and disconnect enclosures and exposed conduits.
- B. Apply sealant in gaps 3/16 inch and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.
- C. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- D. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.

- E. Touch up suction spots after application of first finish coat.
- F. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- G. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- H. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- I. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.4 ADJUSTMENT

- A. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.5 CLEANING

- A. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of paint Sections from premises.

3.6 PAINT COLOR SCHEDULE

- A. Color Levels:
 - 1. Color Level II:
 - a. Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b. No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
 - 2. Color Level III:
 - a. Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b. Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.
- B. Colors:
 - 1. Interior:
 - a. Interior CMU:
 - 1) Class One Color Quality Standard: As selected by architect.
 - b. Interior Gypsum Board, Plaster:
 - 1) Class One Color Quality Standard: As selected by architect.
 - c. Interior Metal:
 - 1) Class One Color Quality Standard: As selected by architect.
 - d. Interior Painted Wood:
 - 1) Class One Color Quality Standard: As selected by architect.
 - e. Interior Clear Finished Wood: Match other interior clear finished wood building elements. See Section 09 9324.
 - 2. Exterior:
 - a. Exterior Metal:
 - 1) Class One Color Quality Standard: As selected by architect.
 - b. Exterior CMU, Concrete, Stucco:
 - 1) Class One Color Quality Standard: As selected by architect.
 - c. Exterior Wood:
 - 1) Class One Color Quality Standard: As selected by architect.

END OF SECTION

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SECTION 09 9123

INTERIOR PAINTED GYPSUM BOARD, PLASTER

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Preparing, priming, and finish painting new interior gypsum board and plaster surfaces .
- B. Related Sections:
 - 1. Section 09 9001: Common Painting Requirements.
 - 2. Section 09 9413: Textured finishings.

1.2 SYSTEM DESCRIPTION

- A. All Other: Use MPI(a) INT 9.2B Latex Finish system.
- B. Use MPI Premium Grade finish requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Category Four Approved Products: Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located. See Section 01 6000 for definitions of Categories.
- B. Primer: MPI Product 50.
- C. Finish Coats:
 - 1. Painted Surfaces:
 - a. Gloss / Sheen Required: Gloss Level 5.
 - b. MPI Product 141.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.

END OF SECTION

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SECTION 09 9124

INTERIOR PAINTED METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Preparing and painting new interior metal surfaces as described in Contract Documents.
- B. Related Sections:
 - 1. Section 09 9001: Common Painting Requirements.

1.2 SYSTEM DESCRIPTION

- A. Ferrous Metal : Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
- B. Galvanized Metal: Use MPI(a) INT 5.3J Latex Finish system.
- C. Aluminum: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system.
- D. Use MPI Premium Grade finish requirements.

1.3 SEQUENCING

- A. Paint brackets furnished under Section 05 5871 before installation of bracket.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Gloss / Sheen Level Required: Gloss Level 5.
- B. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
 - 1. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
 - 2. Primers:
 - a. Ferrous Metal: MPI Product 107.
 - b. Galvanized Metal: MPI Product 134.
 - c. Aluminum: MPI Product 95.
 - 3. Finish Coats: MPI Product 110, G5.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General:
 - 1. See appropriate paragraphs of Section 09 9001.
 - 2. Systems specified are in addition to prime coats furnished under other Sections.

- B. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

END OF SECTION

DIVISION 15: MECHANICAL

15 100 MECHANICAL GENERAL REQUIREMENTS

15 300 PIPING SYSTEMS, SPECIALTIES, INSULATION AND VALVES

15 400 PLUMBING SYSTEMS

15 500 FIRE PROTECTION

15 800 AIR DISTRIBUTION, HEATING AND AIR CONDITIONING

END OF TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15100

MECHANICAL REQUIREMENTS

GENERAL CONDITIONS:

The General Conditions of the Contract, with the amendments, supplements, forms and requirements in Division 1, and herewith made a part of this Division.

All sections of Division 15 shall comply with the Mechanical General Requirements. The standards established in this section as to quality of materials and equipment, the type and quality of workmanship, mode of operations, safety rules, code requirements, etc., shall apply to all sections of this Division as though they were repeated in each Division.

SCOPE OF WORK:

The project described herein is the 2006 Priorities Projects for the Washington Country School District. This work shall include all labor, materials, equipment, fixtures, and devices for the entire mechanical work and a complete operating and tested installation as required for this project.

Section 15100	Mechanical General Requirements
Section 15300	Piping Systems, Specialties, Insulation and Valves
Section 15400	Plumbing Systems
Section 15500	Fire Protection
Section 15800	Air Distribution, Heating and Air Conditioning

CODES & ORDINANCES:

All work shall be executed in accordance with all underwriters, public utilities, local and state rules and regulations applicable to the trade affected. Should any change in the plans and Specifications be required to comply with these regulations, the Contractor shall notify the Architect before the time of submitting his bid. After entering into contract, the Contractor will be held to complete all work necessary to meet these requirements without extra expense to the Owner. Where work required by drawings or specifications is above the standard required, it shall be done as shown or specified.
Applicable codes are as follows:

2003	International Building Code
2003	International Mechanical Code
2003	International Plumbing Code

UTILITIES & FEES:

Contractor is responsible to obtain all permits and fee information for this project.

Unless noted otherwise, all systems furnished and or installed by this Contractor, shall be complete with all utilities, components, commodities and accessories required for a fully functioning system.

ALTERNATE EQUIPMENT:

The Contractor should protect himself with the supplier of alternate named equipment. Alternate named equipment will be reviewed only one time.

Should alternate equipment be submitted and be rejected, it shall not be resubmitted for review and it shall be the responsibility of this contractor. The contractor shall only submit on design equipment on future submittals. Incomplete submittal data will be rejected.

If the Engineer is required to do additional design work to incorporate changes caused by submitting equipment or products, different than the design equipment specified, as defined above, the contractor shall reimburse the engineer for additional time and expenses at the engineers current, recognized, hourly rates.

DRAWINGS AND MEASUREMENTS:

DRAWINGS:

The contract document drawings show the general design, arrangements, and extent of the system. In certain cases, the drawings may include details that show more nearly exact locations and arrangements; however, the locations, as shown diagrammatically, are to be regarded as general.

It shall be the work of this Section to make such slight alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper shape when done. All dimensions given on the drawings shall be verified as related to this work and with the Architect's office before work is started.

This Section shall carefully study building sections, space, clearances, etc., and then provide offsets in piping or ductwork as required to accommodate the building structure without additional cost to the Owner. In any case and at any time, a change in location required by obstacles or the installation of other trades not shown on the mechanical plans shall be made without charge.

The drawings shall not be scaled for roughing in measurements nor shall they be used as shop drawings. Where drawings are required for these purposes or where drawings must be made from field measurements, the Contractor shall take the necessary measurements and prepare the drawings. Shop drawings of the various subcontractors shall be coordinated to eliminate all interferences and to provide sufficient space for the installation of all equipment, piping, ductwork, etc.

The drawings and specifications have been prepared to supplement each other and they shall be interpreted as an integral unit with items shown on one and not the other being furnished and installed as though shown and called out on both.

EQUIPMENT CAPACITIES:

Capacities shown for equipment in the specifications and on the drawings are the minimum acceptable. No equipment shall be considered as an alternate, which has capacities or performance less than that of design equipment.

All equipment shall give the specified capacity and performance at the job-site elevation of 2600 feet above sea level. Manufacturers' standard ratings shall be adjusted accordingly. All capacities and performances listed on drawings or in specifications are for job-site conditions.

SEISMIC REQUIREMENTS FOR EQUIPMENT:

All equipment must be furnished structurally adequate to withstand seismic forces as outlined in the International Building Code. Equipment bases shall be designed for direct attachment of seismic snubbers and/or seismic anchors.

COOPERATION WITH OTHER TRADES:

The Contractor shall refer to other drawings and parts of this specification that cover work of other trades that is carried on in conjunction with the mechanical work such that all work can proceed without interference resulting from lack of coordination.

The Contractor shall properly size and locate all openings, chases, sleeves, equipment bases, and accesses. He shall provide accurate wiring diagrams to the Electrical Contractor for all equipment furnished under this Division.

The ceiling cavity must be carefully reviewed and coordinated with all trades. In the event of conflict, the installation of the mechanical equipment and piping shall be in the following order: plumbing, waste, and soil lines; supply, return, and exhaust ductwork; water piping; medical gases; fire protection piping; and pneumatic control piping.

The mechanical Contractor shall insure that the installation of all piping, ducts and equipment is in compliance with Articles 110-16 and 384-4 of the National Electrical Code relative to proper clearances in front of and over all electrical panels and equipment. No piping or ductwork will be allowed to run over electrical panel.

RESPONSIBILITY OF CONTRACTOR:

The Contractor is responsible for the installation of a satisfactory piece of work in accordance with the true intent of the drawings and specifications. He shall provide, as a part of his work and without expense, all incidental items required even though these items are not particularly specified or indicated. The installation shall be made so that its several component parts will function together as a workable system and shall be left with all equipment properly adjusted and in working order. The Contractor shall familiarize the Owner's Representative with maintenance and lubrication instructions as prepared by the Contractor and shall explain and fully instruct him relative to operating, servicing, and maintenance of them.

UNFIT OR DAMAGED WORK:

Any part of this installation that fails, is unfit, or becomes damaged during construction, shall be replaced or otherwise made good. The cost of such remedy shall be the responsibility of this Division.

WORKMANSHIP:

Workmanship shall be the best quality of its kind for the respective industries, trades, crafts, and practices, and shall be acceptable in every respect to the Owner's representative. Nothing contained herein shall relieve the Contractor from making good and perfect work in all details in construction.

SAFETY REGULATION:

The Contractor shall comply with all local and OSHA safety requirements in performance with this work. (See General Conditions). This Contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life and property.

WORK, MATERIALS, AND QUALITY OF EQUIPMENT:

Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and all labor shall be done in a most thorough and workmanlike manner.

Products or equipment of any of the manufacturers cited herein or any of the products approved by the Addenda may be used. However, where lists of products are cited herein, the one first listed in the design equipment used in drawings and schedules to establish size, quality, function, and capacity standards. If other than design equipment is used, it shall be carefully checked for access to equipment, electrical and control requirements, valves, and piping. Should changes or additions occur in piping, valves, electrical work, etc., or if the alternate equipment would revise the work of other Contractors, the cost of all changes shall be borne as work of this Division.

PIPE OF FOREIGN MANUFACTURE WILL NOT BE ACCEPTABLE.

The access to equipment shown on the drawings is the minimum acceptable space requirements. No equipment that reduces or restricts accessibility to this or any other equipment will be considered.

All major items of equipment are specified in the equipment schedules on the drawings or in these specifications and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory installation.

All mechanics shall be capable journeymen, skilled in the work assigned to them. No one unskilled in the work, which he is given to do, shall be employed, and all work shall be executed in a skillful and workmanlike manner. All men employed upon this work shall be competent, faithful, orderly, and satisfactory to the Owner.

All welders shall be certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, latest Edition.

PROTECTION AGAINST WEATHER AND STORING OF MATERIALS:

All equipment and materials shall be properly stored and protected against moisture, dust, and wind. Coverings or other protection shall be used on all items that may be damaged or rusted or may have performance impaired by adverse weather or moisture conditions. Damage or defect developing before acceptance of the work shall be made good at the Contractor's expense.

All open duct and pipe openings shall be adequately covered at all times.

INSTALLATION CHECK:

An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.

Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying that the equipment (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping or anchor bolts; and, (4) has been operated under full load conditions and that it operated satisfactorily.

All costs for this work shall be included in the prices quoted by equipment suppliers.

EQUIPMENT LUBRICATION:

The Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. A linen tag shall be attached to each piece of equipment, showing the date of lubrication and the lubricant used. No equipment shall be started until it is properly lubricated.

Necessary time shall be spent with the Owner's Representative to thoroughly familiarize him with all necessary lubrications and maintenance that will be required of him.

Detergent oil as used for automotive purposes shall not be used for this work.

CUTTING AND PATCHING:

No cutting or drilling in structural members shall be done without written approval of the Architect. The work shall be carefully laid out in advance, and cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces necessary for the mechanical work shall be carefully done. Professional plasterers, masons, concrete workers, etc. shall repair any damage to building, piping, or equipment, and all such work shall be paid for as work of this Division.

When concrete, grading, etc., is disturbed, it shall be restored to original condition as described in the applicable Division of this Specification.

FLASHING:

All pipes, ducts and roof drains, which penetrate roofs or exterior walls, shall be flashed and sealed watertight under this Division of the specifications. All plumbing vents shall be extended to not less than 12 inches above the roof. Roof flashings shall be furnished by this Contractor and installed by the Roofing Contractor. Flashings shall be seamless 4-pound sheet lead or of the type required by the Roofing Contractor. Flashings shall be of the size required by the Roofing Contractor and shall extend horizontally not less than 12 inches all around. The Mechanical Contractor shall furnish and install flashings for all services and shall flash and counter flash all ducts and through roofs and exterior walls.

CLEANING AND PAINTING:

CLEANING:

After all tests and adjustments have been made and all systems pronounced satisfactory for permanent operation, this Contractor shall clean all exposed piping, ductwork, insulated members, fixture, and equipment installed under this Section and leave them ready for painting. He shall refinish any damaged finish and leave everything in proper working order. The Contractor shall remove all stains or grease marks on walls, floors, glass, hardware, fixtures, or elsewhere, caused by his workman or for which he is responsible. He shall remove all stickers on plumbing fixtures, do all required patching up and repair all work of others damaged by this division of the work, and leave the premises in a clean and orderly condition.

REMOVAL OF DEBRIS, ETC:

Upon completion of this division of the work, remove all surplus material and rubbish resulting from this work, and leave the premises in a clean and orderly condition.

CONTRACT COMPLETION:

INCOMPLETE AND UNACCEPTABLE WORK:

If additional site visits or design work is required by the Engineer or Architect because of the use of incomplete or unacceptable work by the Contractor, then the Contractor shall reimburse the Engineer and Architect for all additional time and expenses involved.

MAINTENANCE INSTRUCTIONS:

The Contractor shall furnish the Owner complete printed and illustrated operating and maintenance instructions covering all units of mechanical equipment, together with parts lists. This maintenance manual shall be furnished as work of Section 15150.

GUARANTEE:

By the acceptance of any contract award for the work herein described or shown on the drawings, the Contractor assumes the full responsibility imposed by the guarantee as set forth herein and in the General Conditions, and should protect himself through proper guarantees from equipment and special equipment Contractors and from subcontractors as their interests may appear.

The guarantee so assumed by the Contractor and as work of this Section is as follows:

All pipes, conduit, and connections shall be perfectly free from foreign matter and pockets and that all other obstructions to the free passage of air, water, liquid, sewage, and vent shall be removed.

He shall make promptly and free of charge, upon notice from the Owner, any necessary repairs due to defective workmanship or materials that may occur during a period of (1) years from date of Substantial Completion.

All equipment and the complete mechanical system shall be guaranteed for a period of (1) years from the date of the Architect's Certificate of Substantial Completion. Equipment suppliers not willing to comply with this guarantee shall not submit a bid price for this project. The Contractor shall be responsible for a 100-percent guarantee for the system and all items of equipment for this period.

All filters used during construction shall be replaced just before equipment is turned over to the Owner, and all required equipment and parts should be oiled. Any worn parts shall also be replaced.

MECHANICAL EQUIPMENT SUPPORT:

Contractor is responsible for supporting the mechanical equipment (i.e. pipes, ducts, fans, etc.) Mechanical equipment shall not be supported from the roof deck. Mechanical equipment shall be supported from the top cord of the roof joists. Intermediate beams, uni-strut, etc. shall be secured to the roof joists at locations approved by structural engineer. Contractor shall provide and install all materials necessary to adequately support the mechanical equipment. Connection types (i.e. welding, clips, etc.) shall be in accordance with structural engineer recommendations. Contractor shall be responsible for support sizing, locations, and types and shall coordinate with job site conditions. Contractor shall comply with structural drawings and specification.

All equipment shall be independently supported from the structure so that it is not depending on the ceiling for support.

END OF SECTION

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DIVISION 15 - MECHANICAL

SECTION 15300

PIPING SYSTEMS, SPECIALTIES, INSULATION AND VALVES

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

This work includes furnishing all labor and materials to complete all piping systems including piping specialties and valves for the HVAC and plumbing systems.

PIPE AND FITTINGS:

NO PIPE OF A FOREIGN MANUFACTURER WILL BE ACCEPTABLE.

All piping, fittings, flanges, etc. shall be free from defects and shall comply with the appropriate ASTM specifications.

Copper Tubing: ASTM B88, Type L or K as specified.

Cast Iron Soil Pipe and Fittings: ASTM A74

All roof drain and roof drain overflow piping above ground shall be standard weight cast iron with no hub couplings.

All condensate piping for fan coil units shall be type L or K copper piping.

INSULATION:

ROOF DRAINAGE PIPING:

All roof drainage piping shall be covered with Owens-Corning ASJ-25 fiberglass pipe insulation with vapor seal jacket. Insulation thickness shall be 1/2 inch.

Approved manufacturers are; Manville, Owens Corning, Certain-Teed, or Knauf.

Prior to application of insulating materials, surfaces to be insulated shall be brushed clean and made free from rust, scale, grease, dirt, and other deleterious materials. Insulation shall be installed to facilitate removal for making repairs. Insulation sections or blocks shall be placed so the least possible damage to insulation will result from inspection or repair of piping or equipment to which it is applied.

Wherever a leak from a valve or other source might drip onto an insulated surface, the surface shall be protected with 22-gauge aluminum band rolled up at the ends and large enough to prevent dripping or splashing on surrounding areas.

Insofar as possible, pipe insulation shall be applied in sectional form. When segmental form is used, segments shall be fit to curved surfaces to which they are applied. All joints shall be carefully pointed with cement. A thin finishing coat of insulating cement and OCF fitting mastic shall be applied on

segmental forms of covering to present a smooth, even surface. Calcium silicate insulation shall be installed in staggered pattern and shall be wired in place at 9 inches on center with 16 ga wire.

Raw ends of insulation shall covered with finishing cement to provide a smooth water proof surface.

PIPE HANGERS AND SUPPORTS:

All necessary structural members, hangers, and supports of approved design shall be provided to keep piping in proper alignment and to prevent transmission of injurious thrusts and vibrations. Pipe hangers shall generally be of the clevis pipe-clamp type with suspension bolts. All bolts shall have provision for vertical adjustment and shall be equipped with locknuts. Where concrete inserts are used, they shall be suitably reinforced. The Contractor shall obtain approval of the Architect for the location of such inserts prior to their installation. Pipe supports in tunnels shall be roller type with protective saddles. Spring and spring roller hangers shall be used wherever vertical movement of pipe occurs so that pipe and pipe supports shall always be in absolute contact. Expansion shields may be used provided that the hanger is not attached rigidly to the expansion bolt, but is supported from a suitable bracket held in place by expansion bolts. No hanger shall be welded directly to steel joists. Where joists occur, clips shall be installed and hanger rod attached to clips. All piping hung from joists shall be hung from joist panel points. Protective saddles shall be provided on all insulated piping at point of hanger. Hangers shall not contact pipe where pipe is specified to be insulated and hangers shall not penetrate insulation.

All hangers, supports, and anchors shall be assembled with heavy pattern, hexagon carbon steel nuts.

Perforated metal strap shall not be permitted.

Risers shall be properly supported and guided at each floor. Pipe hangers, inserts, rollers, etc., and all necessary accessories required to support piping shall be provided by the Contractor, unless noted otherwise.

All pipe hangers, inserts, trapezes, etc., and this Contractor shall provide all necessary accessories required to support the piping.

All pipe hangers shall be installed outside of insulation on all insulated lines.

Manufacturers may be Blaw-Knox, Grinnell, or Pipe Shields, Inc.

PIPE INSTALLATION:

All piping systems shall be installed so that they can be easily drained by means of drainage of low points of all piping without disconnecting pipe. If not specifically indicated on the drawings, the frequency of draining shall determine whether drain caps, plugs, cocks, or valves are to be used. If other than valves are contemplated, the Architect's permission must be obtained.

All installed pipe lines shall be straight, free from dents, scars, and burrs, with ends reamed smooth, and shall remain straight against strains tending to cause distortion during system operation. The Contractor shall make proper allowance for pipe line expansion and contraction so that no unsightly distortion, noise, damage, or improper operation results there from.

Piping shall run only parallel or at right angles to the walls or axes of the building and shall be neatly organized. The Contractor shall study the architectural, structural, mechanical, electrical, and other drawings to eliminate conflict of piping with other structure lighting or other services. Unless specified otherwise, no piping shall be exposed in a finished room, except in shop or storage areas. All changes in direction shall be made with fittings.

No piping shall be run above any electrical panels, electrical equipment or access clearances for electrical for electrical panels or equipment. No piping shall be allowed to run through any electrical rooms.

All piping shall be clean and free from acids and loose dirt when installed and shall be kept clean during the completion of the installation.

Plugs of rags, wools, cottons, waste, or similar materials may not be used in plugging. All piping shall be so arranged to not interfere with removal of other equipment or devices; and to not block access to manholes, access openings, etc. Piping shall be arranged to facilitate equipment maintenance. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment. Piping shall be placed and installed so that there will be no interference with the installation of the air-conditioning equipment, ducts, etc. All piping shall be so installed to insure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access, and all valves shall be regulated and packed, and the glands shall be adjusted at the completion of the work and before final acceptance. All piping shall be erected to insure proper draining. Cooling and heating piping mains may be run level, with traps avoided where possible. Drain valves shall be provided at all low points and manual air vents at all high points in heating and cooling piping. No bushings, short nipples, or street-type fittings shall be used.

Drain valves shall be installed at all low points in all piping systems to allow for complete drainage of piping systems.

When a roller hanger supports insulated pipes they shall be protected from damage by suitable pipe covering protection saddles. Saddles shall support pipe on roller and shall be packed with insulation.

Prior to the completion of the job (School District Acceptance) the school district will run a camera test of the sewer system to ensure proper installation. This will be done at no additional cost to the contractor.

PIPE SLEEVES:

All pipes passing through wall, floor, or ceiling construction shall be fitted with sleeves. Each sleeve shall extend through its respective floor, ceiling, or wall and shall be cut flush with each surface except in unfinished areas. Unless otherwise specified, sleeves shall be two pipe sizes larger in diameter than the un-insulated passing pipe. Sleeves in outside walls shall be made of galvanized steel pipe with a water-stop flange.

Sleeves in all finished room floors shall be left flush with floor and caulked watertight around pipe; sleeves in unfinished room floors and under cabinets shall be left standing 2 inches above finished floor. All sleeves are to be caulked watertight with sealing mastic.

All sleeves, except in concrete walls, shall be furnished and installed as work of this Section and installed as work of Division 3, Concrete.

Sleeves for concrete or masonry shall be galvanized steel or cast iron pipe. Sleeves for stud walls shall be 26-gauge galvanized iron. These shall be furnished and installed in close cooperation with the craft involved. These sleeves shall be of sufficient size to readily clear the pipe or pipes and insulation passing through sleeve. Everything more than 6 inches in diameter or groups of multiple piping shall be approved by the Architect.

Bare Pipe: All pipe (except ABS) penetrating firewalls and floors shall be encased in adjustable sheet metal cans sized for maximum one-inch spacing between pipe and can. Spacing shall be packed on either end with UL rated ceramic fiber strip insulation. Pipe Shields, Inc., Model WFB.

All holes required for piping through floors or walls, where sleeves have not been installed, shall be core drilled one pipe size larger in diameter than passing pipe.

This Division shall be responsible for the proper sizing and positioning of all necessary boxes and sleeves through walls and floors to accommodate this work.

ANCHORS AND GUIDES:

All pipes shall be securely anchored where necessary to properly distribute expansion stresses. All vertical risers shall be anchored at the midpoint and at additional locations as required.

Anchors shall be located where indicated by the drawings or required and shall be applicable to the type of piping installed. All anchor bolts, after tightening, shall be welded to the anchor frame in such a manner that all anchor bolts are effective. Additional restraining pipe supports shall be provided wherever danger of excessive pipe movement exists.

Aligning guides of the concentric ring type shall be installed and anchored at all locations where piping may be distorted from the normal centerline movement of the piping and on either side of all expansion joints. Two guides, spaced 3 feet 0 inches on centers shall be provided at each side of the expansion joint or the expansion loop. Job or shop-fabricated guides are not acceptable.

END OF SECTION

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DIVISION 15 - MECHANICAL

SECTION 15400

PLUMBING SYSTEMS

SCOPE OF WORK:

This work shall include all plumbing fixtures required for a complete rainwater drainage system.

CODES AND STANDARDS:

All work included in the scope of this specification shall conform to the latest adopted versions of applicable codes and standards, including the following:

- International Plumbing Code
- International Building Code
- International Mechanical Code
- UOSHA
- PDI
- ADA

SUBMITTALS:

Submit the following:

Roof drains, downspout nozzles.

TESTS:

Enclosed Piping: Any piping which is to be insulated, placed within the construction, or otherwise concealed shall be carefully tested before being permanently enclosed.

CLEANOUTS:

Full size cleanouts shall be installed at the base of each rainwater stack and at the end of each horizontal run. All other cleanouts shall be installed where shown on the drawings and where required by State, local, or National Plumbing Codes.

Cleanouts shall have cast-iron bodies with threaded brass screw plugs. They shall be the full size of the pipe line in which they are installed, up to and including 4 inches. All cleanouts shall be installed in locations easily accessible for rodding. Where stacks or other piping is concealed, cleanouts shall be installed above the floor with extensions made to the finished wall surface. Cleanouts in walls shall be J. R. Smith 4402 with countersunk plugs and round stainless steel access covers. In floors, J. R. Smith 4023 square top cleanouts with countersunk plugs and round scoriated polished nickel bronze access covers with frames shall be used.

Cleanouts shall be J. R. Smith, Zurn, or Josam. J. R. Smith references are used herein.

Sleeves for pipes passing through walls, floors or ceilings shall be as specified in Section 15300.

PIPING LAYOUTS:

Layout of piping shown on drawings is in a general sense diagrammatic as to the exact location of piping. It is to be understood by the Contractor that unforeseen conditions and obstacles at the site may not permit the running of piping as scaled from the drawings, but changes shall not be made without the written permission of the Architect. The Plumbing Contractor shall check toilet room details as shown on the Architectural drawings. He shall check the grade of a waste line with a transit before installing the pipe.

PLUMBING FIXTURES:

This Contractor shall furnish and install all fixtures shown on the drawings or specified hereinafter, shall make all parts complete, and shall leave the entire system in perfect working order. He shall clean and adjust all fixtures before leaving the job. Any damaged or cracked fixtures shall be replaced at the Contractor's expense.

The fixtures shall be all new and complete as shown or described in catalog or as required for the work. Roof drains and downspout nozzles shall be Zurn, Josam, Wade or J.R. Smith.

FIXTURE SCHEDULE:

DN-1 Downspout Nozzle: Smith #1770-PB Polish brass body and flange.

RD-1 Roof Drain: Smith #1010-C-R-CID duco cast iron body with combined flashing collar and gravel stop, with underdeck clamp and with low profile cast iron dome. Size shown on drawings.

RDO-1 Overflow Roof Drain: Smith #1080-C-R-CID duco cast iron body with combined flashing collar and gravel stop, with underdeck clamp and with low profile cast iron dome. Complete with 2" dam.

Smith Figure 5020 "Hydrotrol", Rated at 60 F.U. Smith 5030 "Hydrotrol", Rated at 113 F.U. Contractor shall verify the size of F.U. and select the proper water hammer arrestor.

END OF SECTION

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DIVISION 15 -MECHANICAL

SECTION 15500
FIRE PROTECTION

SUMMARY:

This Section includes fire-suppression piping and equipment for the following building systems:

Wet-Pipe, Fire-suppression sprinklers, including piping and automatic sprinklers. Contractor shall relocate and provide additional sprinklers and piping as required for sprinkler coverage.

Contract starting point: at connection to existing overhead sprinkler piping system.

DEFINITIONS:

Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

Authority having Jurisdiction: The building official, Engineer and the insurance underwriter where applicable.

SYSTEM PERFORMANCE REQUIREMENTS:

Sprinkler Occupancy Hazard Classifications: As follows:

Building Service Areas: Ordinary Hazard, Group 1.

Minimum Density for Automatic-Sprinkler Piping Design: As follows:

(Reduce Design areas with quick response heads when applicable and increase design area as required for pitched ceilings).

Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500- sq. ft. area.

Maximum Protection Area per Sprinkler: As follows (except as modified by authorities having jurisdiction)

Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.

Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

SUBMITTALS:

Product Data: For the following:

(ALL PRODUCTS TO BE DOMESTIC MANUFACTURED)

Pipe and fitting materials and methods of joining for sprinkler piping.

Pipe hangers and supports.

Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.

Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, unless noted otherwise. Drawings are to be approved by the Engineer prior to submitting to other authorities having jurisdiction.

Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping".

QUALITY ASSURANCE:

Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction. The Engineer requires evidence to support the ability of the contractor to perform work in the scope and volume as specified. A contractor who cannot show such experience, may be found not suitable to perform the work.

PRE-APPROVED CONTRACTOR LIST:

Delta Fire
Western States
Grinnell
Western Automatic
Firetrol
Fire Engineering
Chaparral
Blazemaster
Fire Systems

Engineering Responsibility: Preparation of working plans using AutoCad compatible drawing program, calculations, and field test reports by a qualified professional engineer or Engineering Technician NICET Level III. Base calculations on results of flow test data provided.

Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.

Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:

NFPA 13-02, "Installation of Sprinkler Systems."
NFPA 70-02, "National Electric Code."
NFPA 72-02, "National Fire Alarm Code."

International Conference of Building Code Officials codes and standards complying with the following:

IBC-2003, "International Building Code."
IFC-2003, "International Fire Code."

PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

SPRINKLERS:

Tyco Corp.
Firematic Sprinkler Devices, Inc.
Reliable Automatic Sprinkler Co., Inc.
Viking Corp.
Victaulic Co. of America

Keyed Couplings for Steel Piping:

Tyco Corp.
Victaulic Co. of America
Gruvlok.
Ward, Couplox

Press-Seal Fittings for Steel Piping: (not allowed)

PIPING MATERIALS:

Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

PIPES AND TUBES:

Standard-Weight Domestic Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller.

Thinwall, Threadable Steel Pipe: (Dyna-Thread 40.) (Not allowed)

Schedule 10 Steel Pipe: . (DynaFlow-10) (Not Allowed)

Thinwall Steel Pipe: (Not allowed)

Hybrid Steel Pipe: . (Not allowed).

PIPE AND TUBE FITTINGS:

Cast-Iron Threaded Flanges: ASME B16.1.

Cast-Iron Threaded Fittings: ASME B16.4.

Steel, Threaded Couplings: ASTM A 865.

Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.

Steel Flanges and Flanged Fittings: ASME B16.5.

Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2 JOINING MATERIALS:

4 Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536,
6 ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for
couplings for dry piping.

8 Transition Couplings: AWWA C219, sleeve type, or other manufactured fitting the same size as, with
10 pressure rating at least equal to, and with ends compatible with piping to be joined.

12 SPRINKLERS:

14 Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating,
unless otherwise indicated or required by application.

16 Sprinkler types, features, and options include the following:

- 18 Pendent sprinklers.
Quick-response sprinklers.
20 Recessed sprinklers, including escutcheon.
Sidewall sprinklers.
22 Upright sprinklers.

24 Sprinkler Finishes: Chrome-plated & White

26 Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications.
Escutcheons for and recessed-type sprinklers are specified with sprinklers.

28 Ceiling Mounting: white steel, two piece, with 1-inch vertical adjustment.

30 Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

32 SPECIALTY SPRINKLER FITTINGS:

34 Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible
36 with piping.

38 Locking-Lug Fittings: (not allowed).

40 Mechanical-T Fittings: (not allowed typically- may be used for connection to existing main piping only)

42 Mechanical-Cross Fittings: (not allowed).

44 Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.

46 EXECUTION

48 EXAMINATION:

50 Examine roughing-in for piping to verify actual locations of piping connections before installation.

52 Proceed with installation only after unsatisfactory conditions have been corrected.

54 COORDINATION:

2 All work of this contractor will be coordinated with other trades to insure minimal changes to the sprinkler
4 system from the designs. Careful coordination of mechanical and electrical ducts, pipe and conduit shall
be required.

6 The ceiling cavity must be carefully reviewed and coordinated with all trades. In the event of conflict, the
8 installation of the mechanical equipment and piping shall be in the following order: plumbing waste,
rainwater, and soil lines; supply, return, and exhaust ductwork, water piping, fire protection piping; and
10 pneumatic control piping.

12 All piping shall be run concealed where possible. All lines will be run as high as possible so as to not
interfere with future changes to ceiling heights or other mechanical equipment. This contractor will be
14 responsible for all sleeves, core drills, and sealing of penetrations in walls, floors, and structural members
to facilitate the installation of the system, however, no holes in structural members will be allowed unless
16 approved by the structural engineer.

18 PIPING APPLICATIONS:

Sprinkler Main Piping: Use the following:

20 NPS 8 and Smaller: Schedule 40 Steel pipe with threaded ends, or grooved ends. No plain ends
22 allowed.

24 Outlets shall be welded, Mech. tee fittings are not allowed. Mechanical tee may be used for
connection to existing mains only.

26 Branch line piping: Use the following:

28 NPS 2 and Smaller: Threadable steel pipe with threaded ends; cast- or malleable-iron threaded
30 fittings; and threaded joints. (Mech. Tee fittings are not allowed)

32 JOINT CONSTRUCTION:

34 Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

36 Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with roll-grooved ends; steel, grooved-end
fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts
38 according to coupling manufacturer's written instructions.

40 PIPING INSTALLATION:

42 Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and
arrangement of piping. Install piping as indicated, as far as practical.

44 Deviations from approved working plans for piping require written approval from authorities having
jurisdiction. File written approval with Architect before deviating from approved working plans.

46 Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe
48 sizes.

50 Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged
52 devices or in piping installations using grooved joints.

54 Install sprinkler piping with drains for complete system drainage.

Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping and to NFPA 14 for standpipes.

No powder driven studs allowed.
Wrap-around braces are to be provided at end of branch lines.

SPECIALTY SPRINKLER FITTING INSTALLATION:

Install specialty sprinkler fittings according to manufacturer's written instructions.

SPRINKLER APPLICATIONS:

General: Sprinkler heads shall be of the latest design closed spray type for 155°F unless specified otherwise or required by code. Heads in Light Hazard Occupancies shall be quick response type typically. Heads shall be a minimum orifice size of 1/2". Use sprinklers according to the following applications:

Rooms without Ceilings: Upright and/or pendent sprinklers. Provide mechanical guards on all heads at or below 7'-0" height above the floor or where damage from room occupant use may occur.

Rooms with Ceilings: Recessed sprinklers.

Wall Mounting: Sidewall sprinklers with recessed escutcheon.

Spaces Subject to Freezing: Upright; pendent, dry-type; and sidewall, dry-type sprinklers.

Provide freeze proof type automatic sprinkler heads serving exterior canopy area, unconditioned spaces, areas subject to freezing and in other areas requiring their use.

Heads located within the air streams of unit heaters or other heat-emitting equipment shall be selected for proper temperature rating.

Sprinkler Finishes: Use sprinklers with the following finishes:

Upright, Pendent, and Sidewall Sprinklers: Chrome

Recessed Sprinklers: Bright white with bright white escutcheon.

Sprinklers: Use the following:

All sprinklers shall be listed, quick response type.
Finish ceiling spaces shall have recessed-type canopies.

SPRINKLER INSTALLATION:

Every effort shall be required to insure that the heads form a symmetrical pattern in the ceiling with the ceiling grid, lights, diffusers and grilles. Offsets shall be made in piping to accommodate ductwork in the ceiling. Heads should be symmetrical and all piping run parallel or perpendicular to building lines.

In no case shall sprinkler heads be installed closer than approved distances from ceiling obstructions and HVAC ductwork.

Sprinkler heads shall not conflict with tile grids.

Where layout of sprinkler heads is shown on reflected ceiling plans the locations shall be followed unless approval is obtained from the Architect or such locations shown do not meet the requirements of NFPA-13. In either case, approval of the Architect shall be obtained in writing before sprinkler head locations are changed. If the installation of additional heads are needed to conform to NFPA 13 requirements in areas where heads are shown on reflected ceiling plans, they shall be included in the contract price.

LABELING AND IDENTIFICATION:

Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

FIELD QUALITY CONTROL:

Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.

Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

Report test results promptly and in writing to Architect and authorities having jurisdiction.

CLEANING:

Clean dirt and debris from sprinklers.

Remove and replace sprinklers having paint other than factory finish.

PROTECTION:

Protect sprinklers from damage until Substantial Completion.

COMMISSIONING:

Verify that specified tests of piping are complete and that "Material Test Certificates" are complete.

Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.

Fill wet-pipe sprinkler piping with water.

Coordinate with fire alarm tests. Operate as required.

DEMONSTRATION & TESTS:

Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.

All tests will be conducted as required by the local authority having jurisdiction, and in no case less than those required by NFPA standards. As a minimum, piping in the sprinkler system shall be tested at a water pressure at 200 psi for a period of not less two hours, or at 50 psi in excess of the normal pressure when the normal pressure is above 150 psi. Bracing shall be in place, and air shall be removed from the system through the hydrants and drain valves before the test pressure is applied. No apparent leaks will be permitted on interior or underground piping.

2 The local jurisdiction having authority and the Utah State Fire Marshal's office (where required) shall be
4 notified at least three working days in advance of all tests and flushing. This includes any flushing,
hydrostatic testing, or flow testing that may be required.

6 This contractor shall make all the required tests to the sprinkler system as required by code. He shall be
8 responsible to assure that the Contractor Test Certificates for the overhead work are completed and
delivered to the owner's insurance underwriter to assure proper insurance credit.

10 All tests requiring the witnessing by local authorities will be the responsibility of this contractor. If tests are
12 not run or do not have the proper witness, then they will be run later and all damage caused by the
system, or caused in uncovering the system for such test, will be borne by this contractor.

14 WARRANTY:

16 This contractor shall warranty the sprinkler system and all its components for one year from the date of
18 acceptance by the owner. Any costs incurred to extend any warranties of materials to assure this time
frame shall be borne by this contractor.

20 FIELD QUALITY CONTROL:

22 Flush, test and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.

24 Replace piping system components that do not pass test procedures and retest to demonstrate
26 compliance. Repeat procedure until satisfactory results are obtained.

28 Report test results promptly and in writing to Architect and authorities having jurisdiction.

30 END OF SECTION

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DIVISION 15 - MECHANICAL

SECTION 15800

AIR DISTRIBUTION, HEATING AND AIR CONDITIONING

SCOPE OF WORK:

The scope of work shall include all labor, material, and equipment necessary to complete the air distribution, heating and air conditioning work for the entire project, including but not limited to the following:

Heating and/or air conditioning units and systems.

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Ductless split systems

MATERIALS:

Unless otherwise specified, galvanized iron shall be used throughout, fabricated and installed so that no vibration or noise results. It shall be made from the best grade of galvanized mild steel sheets of the U.S. Standard gauge and shall be free from blisters, slivers, and pits.

All seams shall be hammered and made airtight. The construction of all ductwork, including gauges of metal, bracing layout, etc., shall be in accordance with the following manuals of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

Ductwork and plenums shall be in accordance with SMACNA, "HVAC Duct Construction Standards, Metal and Flexible", latest edition.

SHEET METAL GENERAL REQUIREMENTS:

All duct systems shall be constructed to the pressure requirement indicated for the fan serving that duct system. Ductwork systems with a fan pressure requirement less than 2 inches w.g. shall be constructed to meet the requirements of the 2 inch w.g. pressure class. Ductwork on the suction side of the fan shall be constructed to the negative pressure class requirements. Ductwork on the discharge side of the fan shall be constructed to the positive pressure class requirements.

The Contractor shall exercise utmost care to obtain a smooth surface inside of all ductwork, absolutely free from small fins, imperfect joints, or other obstructions that cause noise and increased friction. Any additional duct offsets or turns not shown on plans or increases in length of run necessary to overcome obstacles shall be called to the attention of the Architect so that an acceptable rearrangement can be worked out. Under no circumstances shall the cross section of any duct be decreased by dents, pipes, or hanger rods running through it unless otherwise indicated on the drawings. Neither shall the shape be changed without approval. No quick transitions that restrict the area shall be used. Where necessary to gain clearance, the duct seams may be turned inside. Structural and Architectural drawings shall be consulted for areas with restrictive clearances. This work shall be installed in cooperation with other trades so that there will be no delay in progress of construction work.

During the installation, the open ends of all ducts shall be protected by covering them with plastic sheet tied in place to prevent debris and dirt from entering. It is extremely important that the duct system be clean before finish painting is done.

DUCT JOINTS:

All supply air and exhaust air duct joints, seams and fittings must be sealed airtight as required by the SMACNA Manual table 1-2, seal classification A. All return air ductwork joints shall be sealed as required by SMACNA Manual table 1-2, seal classification C. The term "seal" or "sealed" means use of mastic or mastic plus tape or gasketing as appropriate.

All traverse joints on metal rectangular ducts 30" and over and all exhaust ductwork 12" and larger shall be constructed using the Ductmate 4-bolt duct connection system. The system must be installed according to the manufacturer's instruction and assembly booklet.

The Ductmate or Ward system shall be comprised of a hollow, slip-on flange, containing a factory applied integral sealant and separate corner pieces to connect the two flanges to form a rectangular frame. This frame shall be affixed to the duct, and bolted together at the corners. Install a gasket between the flanges, and a support cleat to join the flanges on the outside.

The system components shall consist of:

1. flange - 20 ga. roll formed galvanized steel, containing an integral sealant.....
2. corner piece - stamped cold formed galvanized steel, embossed and stiffened.....
3. gasket - closed cell neoprene, 5% max. shrinkage, 5% max. water absorption, self-extinguishing, zero burn rate.....
4. cleat - steel or PVC construction, can be either snapped on, or driven over the joined flanges.....
5. nut and bolt - regular 3/8" x 1" stove bolt, one n/b connects two corner pieces, four n/b per joint.....

HANGERS AND SUPPORTS:

Hangers for ducts up to 18 inches in width shall be placed on not more than 8-foot centers. Ducts 19 inches and over in width shall be supported on not more than 4-foot centers. Hangers shall be placed plumb and shall present a neat appearance. Duct hangers shall be constructed of galvanized band iron 1 x 1/8 inch for ducts up to 36 inches in width. On ducts 37 inches and more in width, hangers shall be constructed from galvanized angles not less than 1 x 1 inch. The use of perforated band iron for duct support is prohibited. Hangers shall extend down the sides of the ducts not less than 9 inches. On ducts less than 9 inches in depth, hangers shall extend the full depth of the ducts. Attach hangers to the ducts with not less than three rivets or Parker screws of the appropriate sizes. It is essential that all ducts be rigidly supported. Where vertical ducts pass through floors or roofs, a flanged sheet metal collar around the duct shall be welded to the duct, and supporting angles shall be rigidly welded to the duct collars and to the structure. Additional supports shall be provided as required. Angles used shall be galvanized and of sufficient size to support the ductwork rigidly. Horizontal round ductwork shall be

supported 6 feet 0 inches o.c. with 2-inch wide bands of 18-gauge galvanized steel wrapped around the duct.

ROUND DUCTWORK - LOW PRESSURE:

The round ductwork and accessories shall be factory fabricated, spiral conduit as manufactured by United Sheet Metal Company, Metco, Sheet Metal Products Co., Everdur, Ventline or Dees Spiral Pipe and Fittings. The conduit shall be constructed of rust-resistant zinc-coated steel of the sizes called for on the drawings. Conduit 3 inches to 8 inches in diameter shall be 26-gauge steel.

All elbows and fittings shall be fabricated from galvanized sheets at least one gauge heavier than connecting conduits. Ninety-degree elbows shall be equal to United Sheet Metal Company type E-5, five-piece construction with a centerline radius of 1-1/2 times the pipe diameter. All elbows and fittings shall be constructed in accordance with SMACNA recommendations.

Round duct joints shall be assembled and sealed as follows:

Approved sealer equal to "Hard Cast" shall be applied to the coupling and fittings. After the joint is slipped together, sheet metal screws are placed 1/2 inch from the joint bead for mechanical strength. Sealer is then applied to the outside of the joint, extending 1 inch on each side of the joint bead and covering the screw heads. Plastic backed tape is immediately applied over the wet sealer.

The duct sealer must be specifically formulated for the job of sealing the field joints for high-pressure systems. The sealer shall be compatible with plastic-backed duct tape so the two shall cure and bond together. Samples of sealer and tape and the specification data sheets shall be submitted to the Engineer for approval.

FLASHING:

Where ducts pierce roof construction, the flashing shall be provided as part of this section and shall be as detailed in the SMACNA manuals. Flashing shall be welded to ducts.

Roof-supported ducts shall be supported from the subroof and supports shall be mopped to the roof and flashed.

DIMENSIONS:

Ducts, unless otherwise approved, shall conform accurately to the dimensions indicated on the drawings, and shall be straight and smooth on the inside with joints neatly finished. All duct sizes are net free inside dimensions. Acoustically lined ducts shall have outside dimensions increased as required to accommodate the acoustic lining specified and still maintain the free area inside dimensions shown on the drawings.

FIELD VERIFICATION:

No ductwork shall be fabricated without first field verifying that the available space under the actual job conditions will permit installation of the ductwork without structural of other conflicts. This Contractor shall provide all necessary offsets and transitions to make all parts fit without additional compensation.

DUCT CLEANING:

Before ducts are insulated and before the ceiling is installed and final connections made to the terminal boxes, the fans shall be operated at full capacity to blow out any dirt and debris from the ducts. The full capacity of the fan shall discharge into the duct. If it is not practical to use the main supply blower for this cleaning, the ducts may be blown out in sections by a portable fan. After the ducts have been cleaned and initially pressure tested, the final connection shall be made to the terminal boxes.

VOLUME DAMPERS:

Opposed-blade balancing dampers (OBD) to 12 inches by 36 inches: Dampers used in low-velocity branch ducts to control the volume or air flow shall be Young No. 817 volume control dampers. An operating head shall be placed on the side of the duct and shall be locked in position by a set key where the damper is accessible. Where the damper is not accessible, Young No. 817A or 817B volume control damper, consisting of an end bearing or miter gear, coupling, 3/8-inch square shaft, and a 31 x 3/8 inch regulator for operating the unit from suspended ceiling shall be provided.

Opposed-blade balancing dampers (OBD) larger than 12 inches by 36 inches: (Air Balance type AC2) opposed-blade damper of 14-gauge galvanized steel with locking quadrant shall be used or Ruskin, Louvers and Dampers, Daniel, United Air, or Safe Air.

SPLIT SYSTEM - CEILING SUSPENDED FAN COIL UNIT:

Furnish and install indoor, under-ceiling mounted, direct expansion fan coil unit to be used without ductwork. Unit shall consist of centrifugal blower type fan, fan motor, cooling coil, piping connectors, electrical controls, solid-state electro-mechanical control system, and ceiling mounting brackets. Unit shall be capable of being used in a refrigerant circuit with a matching outdoor heat pump.

Unit shall be rated per ARI Standard 210/240. Units shall be certified by UL and CSA.

Cabinet shall be zinc-coated bonderized steel finished with a baked enamel paint. Inlet grilles shall be attractively styled, high-impact polystyrene. Matching mounting brackets shall be provided.

Fans shall be centrifugal blower type with air intake in the bottom rear of the unit and discharge in the front. Automatic motor-driven vertical air sweep shall be provided.

Coils shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coils shall have a drain connection for attachment of piping to remove condensate.

Motors shall be permanently lubricated with inherent overload protection. Fan motor shall be 3-speed.

Controls shall consist of a solid-state electromechanical control system which shall control space temperature and determine optimum fan speed. The temperature control range shall be from 64 F to 84 F. The unit shall have the following functions as a minimum:

An automatic restart after power failure at the same operating conditions as failure.

Electronic 7-day programmable thermostat.

Evaporator coil freeze protection.

Wired control to enter set points and operating conditions.

Filter status indication after 250 hours of indoor fan operation.

Automatic air sweep control to provide on or off activation of air sweep louvers.

Cooling mode to provide modulating fan speed.

Fan only operation to provide room air circulation when no cooling is required.

A 50 foot indoor to outdoor control connection cable shall be provided with the fan coil unit.

Fan speed control shall be user-selectable; high, medium, low, or automatic operation during all operating modes.

A time delay shall prevent compressor restart in less than 2 or 4 minutes (adjustable).

Automatic heating to cooling changeover to provide automatic heating and cooling operation. Control shall include deadband to prevent rapid mode cycling.

Unit shall have filter track with factory supplied cleanable filters.

Unit shall have a fresh air kit complete with filter and duct connections for outdoor ventilation.

SPLIT SYSTEM OUTDOOR UNIT – HEAT PUMP:

Outdoor mounted, air cooled split system outdoor section suitable for rooftop installation. Unit shall consist of a hermetic reciprocating, scroll or rotary compressor, an air cooled coil, propeller type blow thru outdoor fans, reversing valve, accumulator, holding refrigerant charge, heating mode metering device, and control box. Unit shall discharge air horizontally. Units shall function as the outdoor component of an air to air cooling and heating system.

Units shall be used in a refrigeration circuit matched to a duct free cooling fan coil unit.

Unit construction shall comply with ANSI/ASHRAE 15 and with the NEC. Unit shall be constructed in accordance with UL standards and shall be listed in the CEC directory. Air cooled condenser coils shall be leak tested at 350 psig air pressure with the coil submerged in water.

Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked enamel finish. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components. Outdoor compartment shall be isolated and have and acoustic lining to assure quiet operation.

Outdoor fans shall be direct drive propeller type, and shall discharge air horizontally. Fans shall blow air through the outdoor coil. Outdoor fan motors shall be totally enclosed, single phase motors with class B insulation and permanently lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection. Shaft shall have inherent corrosion resistance. Fan blades shall be corrosion resistant and shall be statically and dynamically balanced. Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil.

Compressor shall be fully hermetic reciprocating or scroll type. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from overtemperature and overcurrent. Scroll compressors shall also have discharge gas temperature protection if required. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere. Reciprocating compressors shall be equipped with crankcase heaters to minimized liquid refrigerant accumulation in compressor during shutdown and to prevent refrigerant dilution of oil. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation.

Outdoor coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes which are cleaned, dehydrated, and sealed.

Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, bi flow filter drier, pressure relief, reversing valve, and heating mode metering device.

Operating controls and safeties shall be factory selected, assembled and tested. The minimum control functions shall include:

Time delay restart to prevent compressor reverse rotation on single phase scroll compressors.

Automatic restart on power failure.

Safety lockout if any outdoor unit safety is open.

A time delay control sequence.

High pressure and liquid line low pressure switches.

Automatic outdoor fan motor protection.

Start capacitor and relay.

System diagnostics.

Compressor motor current and temperature over load protection.

High pressure relief.

Outdoor fan failure protection.

END OF SECTION

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DIVISION 16: ELECTRICAL

16 0000 ELECTRICAL

16 0501 ELECTRICAL GENERAL PROVISIONS

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SECTION 16 - ELECTRICAL

1. Electrical General Provisions:

Description of Work: Extent of electrical work is indicated on drawings. Provide all labor, materials, equipment, supervision and service necessary for a complete electrical system. Work includes, but is not necessarily limited to the following items:

- Electrical Connections for Equipment
- Conduit Raceways
- Raceways Systems
- Conductors and Cables
- Electrical Boxes and Fittings
- Supporting Devices
- Wiring Devices
- Motor Starters
- Panelboards
- Motor and Circuit Disconnects
- Overcurrent Protective Devices
- Grounding
- Interior and Exterior Building Lighting
- Telephone System

Quality Assurance: Perform work in accordance with the National Electrical Code (NEC). Comply with requirements of State and Local Ordinances. Obtain all permits, inspections, etc. by authority having jurisdiction. Employ only qualified craftsmen with at least three years experience.

Workmanship shall be neat, have a good mechanical appearance and conform to best electrical state contracting license. Provide equipment and material that are under writers' laboratories (UL) listed and labeled.

Submittals: After the Contract is awarded but prior to manufacture or installation of any equipment, prepare complete shop drawings. Submit eight (8) sets for review of the following:

- Light Fixtures
- Wiring Devices
- Panelboards
- Raceway Systems
- Motor Starters
- Motor and Circuit Disconnects

Record Drawings: Maintain on a daily basis, a complete set of record drawings, reflecting an accurate dimensional record of all buried or concealed work. Mark record drawings to show the precise location of concealed work and equipment, including concealed or embedded conduit and junction boxes and all changes and deviations in the work from that shown on the Contract Documents.

Operation and Maintenance Manuals: Provide operating instruction and maintenance data books for all equipment and materials furnished under this division.

Guarantee: Ensure that electrical systems installed under this contract is in proper wiring order and in compliance with drawings, specifications, and/or authorized changes. Without additional charge, replace any work or materials which develop defect, except from ordinary wear and tear, within one year from the date of substantial completion. Exception: Incandescent lamps shall be guaranteed for a period of two months from the date of substantial completion.

Fire Protection Seals: Seal all penetrations for work of this section through fire rated floors, walls,

and ceilings to prevent the spread of smoke, fire, toxic gas, or water through the penetration either before, during or after fire.

Power Outages: All power outages required for execution of this work shall occur during the non-standard working hours and at the convenience of the owner. Include all costs for overtime work in bid.

2. Electrical Connections for Equipment: Verify exact load and location of all equipment before rough-in, for each electrical connection. Provide complete assembly of material, including but not necessarily limited to, raceways, conductors, cords, cord caps, wiring devices, pressure connectors, terminal (Lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete slices, terminations, and connections are required. For permanently installed fixed equipment, provide flexible seal-tite connection. For movable and/or portable equipment, provide wiring device, cord cap, and multi-conductor cord.
3. Raceways: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thickness) as required; with minimum trade size of 3/4". Install electrical raceway systems in accordance with manufacturer's written instructions, applicable requirement of NEC and NECA "Standard of Installation" in accordance with the following:
 - Feeders: Install feeders rated 100 Amps and greater, in rigid metal conduit (RMC), or intermediate metal conduit (IMC); except where buried below grade, install in concrete encased non-metallic conduit or duct (PVC schedule 40).
 - Branch Circuits, and individual Equipment Circuits rated less than 100 Amps: Install in electrical metallic tubing (EMT) except in poured walls, below concrete slab-on-grade, or in earth fill, install in non-metallic plastic duct. Encase non-metallic plastic duct 1-1/4" and larger in concrete.
 - Provide rigid metal conduit (RMC) for all bends in buried conduit greater than 30 degrees. Provide protective coating for rigid metal conduit bends. Install flexible conduit for connections of motors, transformers, and other electrical equipment where subject to movements and vibrations. Provide OZ, expansion fittings on all conduits crossing building expansion joints, both in slab and suspended.
4. Raceway Systems: Provide metal trench ducts and wall ducts as required for installation of X-ray equipment, of types, sizes and partitions indicated by X-ray shop drawings; with end units, tees, elbows, expansion joints, reducers, couplings including locking screws, coverplates with holddown screws, coverplate supports, and fittings to form a complete installation.
5. Conductors: Provide factory-fabricated conductors for sized, ratings, material, and types indicated for each service. Provide copper conductors, with THHN/THWN insulation. Size all conductors in accordance with NEC; minimum size to be #12 AWG. Provide stranded conductors for #8 AWG and larger.
6. Electrical Boxes and Fittings: Provide one piece galvanized flat rolled sheet steel interior outlet wiring boxes, corrosion-resistant cast-metal weatherproof outlet wiring boxes, code-gage sheet steel junctions and pull boxes, cast-iron waterproof adjustable floor boxes, galvanized cast-metal conduit bodies, corrosion-resistant punched-steel box knockout closures, conduit lockouts and malleable steel conduit bushings and offset connectors, and all accessories as required to suit each respective location and installation. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Use bar hangers for stud construction.
7. Supporting Devices: Provide supports, anchors, sleeves and seals required for a complete

raceway support system, including but not limited to: clevis hangers, riser clamps, c-clamps, beam clamps, one and two hole conduit straps, offset conduit clamps, expansion anchors, toggle bolts, threaded rods, U-channel strut system, and all associated accessories. Install in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Provide rigid attachment of all floor mounted equipment to the floor slab or structural system.

8. Wiring Devices: Provide factory-fabricated wiring devices, in types, and electrical ratings for applications indicated and complying with NEMA STDs Pub No. WD-1. Provide heavy duty specification grade, 2- amperes rated, grounding type convenience outlets,. Provide 20- amperes rated toggle switches. Construct wiring device of heavy duty high impact nylon and provide cover plates to match. Provide devices in colors selected by Architect.
9. Motor Starters: For motors 1 HP and less, provide manual fractional HP motor starters equipped with thermal overload relay. For motors over 1 HP, provide AC combination non-reversing magnetic starts with motor circuit protector.
10. Panelboards: Provide dead-front safety-type panelboards with factory-assembled, bolt-on, molded case circuit breakers in quantities, rating, and types as required. Equip with copper bus bars, full-sized neutral bus, and ground bus. Provide panelfronts with adjustable indicating trim clips, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges and door swigs as indicated. Provide typed directory card on inside of panelboard door.
11. Motor and Circuit Disconnects: Provide general-duty and heavy duty type, sheet enclosed switches, fused or non-fused, with sizes and electrical characteristics as required by application. Equip with solid neutral and operating handle capable of being padlocked in off position. Provide fuses as required.
12. Transformers: Provide factory-assembled, general-purpose, air-cooled, dry-type distribution transformers as required. Provide primary winding with minimum of 4 full capacity taps; each 2- 1/2 percent, two above and two below full rated voltage for de-energized tap-changing operation. Insulate with class 150 insulation and rate for continuous operation at rated KVA. Limit transformer temperature rise to 80 degrees C. Sound-level not to exceed 45 dB.
13. Grounding: Provide grounding and bonding of all electrical and communication apparatus, machinery, appliances, building components, and items required by the NEC to provide a permanent, continuous low impedance, grounding system. Provide a NEC bonding/grounding conductor in all raceways used for power distribution.
14. Lighting Fixtures: Provide lighting fixtures, or sizes, types and ratings indicated complete with, but not necessarily limited to housing, lamps, lamp holders, reflectors, ballasts, starters, and wiring. Provide in-line fusing for all fluorescent and HID ballasts. Size fuses per ballast manufacturer's recommendation. Provide all necessary supports, brackets, and miscellaneous equipment for mounting of fixtures. Support all ceiling mounted fixtures from the building structure with #12 ga. Steel wire attached to each corner; independent of the ceiling system. Provide backing supports. Provide gypsum board protection as required to ensure fire rating of each ceiling in which fixtures are installed. Provide all exterior fixtures with damp or wet location label as required by application. Provide energy conserving lamps and ballast as for all fluorescent fixtures.
15. Telephone Raceway System: Provide complete raceway for telephone/data system as required. Run 3/4" conduit from each telephone/data outlets to terminal backboard, tray or terminal cabinet.

DIVISION 31: EARTHWORK

31 1000 SITE CLEARING

31 1100 CLEARING AND GRUBBING
31 1413 TOPSOIL STRIPPING AND STOCKPILING

31 2000 EARTH MOVING

31 2213 ROUGH GRADING
31 2216 FINE GRADING
31 2316 EXCAVATION
31 2323 FILL

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SECTION 31 0501

COMMON EARTHWORK REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited to:
 - 1. General procedures and requirements for earthwork.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification Of Conditions:
 - 1. 48 hours minimum before performing any work on site, contact Blue stakes to arrange for utility location services. Provide on site search not off site.
 - 2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
 - 3. Perform investigative excavating 10 days minimum in advance of performing any excavation or underground work.
 - 4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within 24 hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

- A. Protection:
 - 1. Spillage:
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
 - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
 - 2. Dust Control:
 - a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.
 - 3. Existing Plants And Features: Do not damage tops, trunks, and roots of existing trees and shrubs on site that are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect. Do not damage other plants and features that are to remain.
- B. If specified precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

3.3 REPAIR / RESTORATION

- A. Adjust existing covers, boxes, and vaults to grade.
- B. Replace broken or damaged covers, boxes, and vaults.
- C. Independently confirm size, location, and number of covers, boxes, and vaults that require adjustment.

3.4 FIELD QUALITY CONTROL

- A. Notify Architect 48 hours before performing excavation or fill work.
- B. If weather, scheduling, or any other circumstance has interrupted work, notify Architect 24 hours minimum before intended resumption of grading or compacting.
- C. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils that have been exposed to adverse weather conditions.

END OF SECTION

SECTION 31 1100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform clearing and grubbing as necessary to prepare site for rough grading and structure excavation as described in Contract Documents.
- B. Related Sections:
 - 1. Section 31 0501: Common Earthwork Requirements.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Tree And Brush Removal:
 - 1. Cut off trees, shrubs, brush, and vegetative growth **12 inches 300 mm** maximum above ground.
 - 2. Do not pull up or rip out roots of trees and shrubs that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Make clean, smooth, sloping cuts.
 - 3. Cut roots **6 inches 150 mm** or larger in diameter only with Architect's written permission.
- B. Grubbing:
 - 1. Grub out stumps and roots **12 inches 300 mm** minimum below original ground surface, except as follows:
 - a. Under buildings, remove roots one inch and larger entirely.
 - b. Entirely remove roots of plants that normally sprout from roots, as identified by Architect.

3.2 CLEANING

- A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.
- B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

END OF SECTION

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SECTION 31 1413

TOPSOIL STRIPPING AND STOCKPILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Strip and stockpile acceptable topsoil for redistribution.
- B. Related Sections:
 - 1. Section 31 0501: Common Earthwork Requirements.
 - 2. Section 32 9113: Finish grading of existing topsoil stored on site.

1.2 DEFINITIONS

- A. Existing topsoil is defined as total amount of soil stripped and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraphs below.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Strip existing vegetation layer from areas of site to receive buildings, landscaping, and paving and remove from site before stripping topsoil for storage and reuse.
- B. After stripping vegetation layer, strip existing topsoil additional from areas of site to receive buildings and paving and store on site for later use.
 - 1. Existing topsoil is property of Contractor with restriction that topsoil is to be used first for Project landscape topsoil requirements and second for fill and backfill.
 - 2. After Project fill, backfill, and landscape topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Architect's written approval.

END OF SECTION

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SECTION 31 2213

ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.
- B. Related Sections:
 - 1. Section 31 0501: Common Earthwork Requirements

1.2 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. Schedule conference after completion of site clearing but before beginning grading work.
 - 2. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
 - 3. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used for fill shall be as specified for backfill in Section 31 2323.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before making cuts, remove topsoil over areas to be cut and filled that was not previously removed by stripping specified in Section 03 1413. Stockpile this additional topsoil with previously stripped topsoil.

3.2 PERFORMANCE

- A. Site Tolerances:
 - 1. Maximum variation from required grades shall be 1/10 of one foot 28 mm.
- B. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.
- C. Compact fills as specified in Section 31 2323.
- D. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

END OF SECTION

FINE GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform fine grading work required to prepare site for paving finish grading and for landscape finish grading and soil preparation as described in Contract Documents.
- B. Related Sections:
 - 1. Section 31 0501: Common Site Construction Requirements.
 - 2. Section 31 1413: Stripping and storing of existing topsoil.
 - 3. Section 32 1313: Finish grading for concrete paving.
 - 4. Section 32 9113: Finish grading and soil preparation for landscaping.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM D 1557-02, 'Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.'

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not commence work of this Section until grading tolerances specified in Section 31 2213 are met.

3.2 PREPARATION

- A. Protection: Protect utilities and site elements from damage.
- B. Surface Preparation:
 - 1. Before grading, dig out weeds from planting areas by their roots and remove from site. Remove rocks larger than 1-1/2 inches 38 mm in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
 - 2. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
 - 3. Limit use of heavy equipment to areas no closer than 6 feet 1800 mm from building or other permanent structures

3.3 PERFORMANCE

- A. Site Tolerances:
 - 1. Maximum variation from required grades shall be 1/10 of one foot 28 mm.
 - 2. To allow for final finish grades of parking lot and planting areas, fine grade elevations before placing topsoil are:
 - a. Sod Areas: 7 inches 175 mm below top of walk or curb.

- B. Do not expose or damage existing shrub or tree roots.
- C. Redistribute approved existing topsoil stored on site as a result of work of Section 31 1413. Remove organic material, rocks and clods greater than 1-1/2 inch 38 mm in any dimension, and other objectionable materials.

END OF SECTION

SECTION 31 2316

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform Project excavating and trenching as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for excavating and trenching performed on Project under other Sections unless specifically specified otherwise.
- B. Related Sections:
 - 1. Section 31 0501: Common Earthwork Requirements.
 - 2. Section 31 1100: Clearing and Grubbing.
 - 3. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Carefully examine site and available information to determine type soil to be encountered. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities:
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

3.3 PERFORMANCE

- A. Excavation:
 - 1. Building Footings And Foundations:
 - a. Excavate as necessary for proper placement and forming of footings and foundations.
 - b. Bottom of excavations to receive footings shall be undisturbed soil.
 - c. Excavation Carried Deeper Than Required:
 - 1) Under Footings: Fill with concrete specified for footings.
 - 2) Under Slabs: Use specified compacted backfill material.
 - 2. Pavement And Miscellaneous Cast-In-Place Concrete:
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Section 31 2324.
 - c. Remove and replace exposed material that becomes soft or unstable.
 - 3. Utility Trenches:

- a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
- b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
- c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
- d. Pipe 4 Inches 100 mm In Diameter Or Larger:
 - 1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
 - 2) Except where rock is encountered, take care not to excavate below depths indicated.
 - a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches 100 mm below required trench depths.
 - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
 - 3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
4. If unusual excavating conditions are encountered, stop work and notify Architect.

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

SECTION 31 2323

FILL

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform Project backfilling and compacting as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for backfilling and compacting performed on Project under other Sections unless specifically specified otherwise.
- B. Related Sections:
 - 1. Section 31 0501: Common Earthwork Requirements.
 - 2. Division 32: Compaction of sub-grade under walks and paving.
 - 3. Performance of backfilling and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 REFERENCES

- A. American Society For Testing And Materials:
 - 1. ASTM D 1557-02, 'Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.'
 - 2. ASTM D 2216-98, 'Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.'
 - 3. ASTM D 2487-00, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).'
 - 4. ASTM D 2922-01, 'Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).'
 - 5. ASTM D 3017-01, 'Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).'

1.3 DEFINITIONS

- A. Relative Compaction: Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 1557.

1.4 SEQUENCING

- A. Do not backfill against bituminous dampproofing for 24 hours after application of dampproofing.
- B. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Site Material: Existing, no organic excavated material on site is suitable for use as fill and backfill to meet Project requirements.
- B. Imported Fill / Backfill:
 - 1. Well graded material conforming to ASTM D 2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas: Fill shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches 150 mm diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch 38 mm in any direction.
 - b. Under Landscaped Areas:
 - 1) Fill more than 36 inches 900 mm below finish grade shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches 150 mm diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch 38 mm in any direction.
 - 2) Fill less than 36 inches 900 mm below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches 38 mm in any direction and 90 percent minimum of fill shall be smaller than 3/8 inch 4.7 mm in any direction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before placing fill, base, or finish work, prepare sub-grade as follows:
 - 1. Do not place fill or base over frozen sub-grade.
 - 2. Under Building Slabs / Pads, Concrete Site Elements: Scarify sub-grade 6 inches 150 mm deep, moisture condition to uniform moisture content of between optimum and 4 percent over optimum, and mechanically tamp 6 inches 150 mm deep to 90 percent minimum of relative compaction.
 - 3. Landscape Areas: Compact sub-grade to 85 percent relative compaction.

3.2 PERFORMANCE

- A. Fill / Backfill:
 - 1. General:
 - a. Around Buildings And Structures: Slope grade away from building as specified in Section 31 2216. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities:
 - 1) In Landscape Areas: Use backfill consisting of on-site soil.
 - c. Do not use puddling or jetting to consolidate fill areas.
 - 2. Compacting:
 - a. Fill / Backfill And Base:
 - 1) Under Building Slabs or Pads: Place in 8 inch 200 mm maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 1557.
 - 2) Under Concrete Site Elements And Around Foundation Walls: Place in 8 inch 200 mm maximum layers, dampen but do not soak, and mechanically tamp to 90 percent minimum of maximum density as established by ASTM D 1557.
 - 3) Utility Trenches:
 - a) Site: Place fill in 12 inch 300 mm layers and moisture condition to plus or minus 2 percent of optimum moisture content. Compact fill to 90 percent minimum relative

- compaction to within 12 inches 300 mm of finish grade. Compact fill above 12 inches 300 mm to 85 percent relative compaction.
- b) Under Slabs: Place fill in 6 inch 150 mm layers, moisture condition to plus or minus 2 percent of optimum moisture content, and compact to 95 percent minimum relative compaction to within 4 inches 100 mm of finish grade. Final 4 inches 100 mm of fill shall be granular base as specified in Section 31 2323.
 - 4) Fill Slopes: Compact by rolling or using sheepsfoot roller.
 - 5) Backfill Under Footings: Not allowed.
 - 6) Other Backfills: Place other fills in 12 inch 300 mm layers and compact to 90 percent relative compaction.

3.3 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.4 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

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SECTION 07 2413

DIAMOND WALL ONE-COAT SYSTEMS

PART I GENERAL

1.01 SECTION INCLUDES

- A. Provide all labor, materials, and equipment necessary to install all aspects of the Diamond Wall One-Coat Systems.

1.02 RELATED SECTIONS

- A. 03300 – Cast-in-Place Concrete
- B. 04200 – Unit Masonry
- C. 05400 – Light gauge cold-formed steel framing
- D. 06110 – Wood Framed Construction
- E. 06160 – Sheathing
- F. 07900 – Joint Sealers
- G. 09220 – Portland Cement Plaster
- H. 09250 – Gypsum Board

1.03 REFERENCES

- A. ASTM C 79 Gypsum Sheathing
- B. ASTM A 641 – Zinc Coated (Galvanized) Carbon Steel Wire
- C. ASTM C 91 – Masonry Cement
- D. ASTM C 150 – Portland Cement
- E. ASTM C 206 – Finishing Hydrated Lime
- F. ASTM C 207 – Hydrated Lime for Masonry Purposes
- G. ASTM C 847 – Standard Specification for Metal Lath
- H. ASTM C 897 – Aggregate for Job-Mixed Portland Cement Based Plaster
- I. ASTM E 119 – Method for fire test of Building Construction Materials
- J. ASTM C 926 – Application of Portland Cement-Based Plaster
- K. ASTM C 1063 – Installation of Lathing and Furring for Portland Cement Based Plaster

- L. PCA (Portland Cement Association) – Plaster (Stucco) Manual
- M. Plaster and Drywall Systems Manual, Third Edition
- N. UBC – Uniform Building Code
- O. ICC ESR-1194
- P. AC 11 – Acceptance Criteria for One-Coat Stucco Systems
- Q. Omega Diamond Wall One-Coat Systems Details

1.04 DEFINITIONS

- A. Accessories – Linear formed metal, metal and paper, or plastic members fabricated for the purpose of forming corners, edges, control joints, or decorative effects in conjunction with plaster assemblies.
- B. Base coat – Coat of plaster directly beneath the finish coat. Brown coat or base coat refers to the base coat plaster applied over wire lath/metal lath.
- C. Insulation board – An optional system component of a specific type and density that functions to reduce heat flow through the wall and serves as the surface to receive the base coat.
- D. Fasteners – Nails or staples are utilized in compliance with UBC 47-C
- E. Finish Coat – A decorative material that provides a protective, textured coating applied to the basecoat.
- F. Flashings – Metal or other membrane flashing material used to intercept and redirect the flow of water to prevent it from entering the building.
- G. Lath – A reinforcement to receive plaster. It is secured to framing or furring members.
- H. Weather Resistive Barrier – Minimum Grade D draft building paper complying with UBC Standard 14-1 is required.

1.05 SYSTEM DESCRIPTION

- A. General: The Diamond Wall One-Coat System is an Exterior Stucco System and is comprised of a weather-resistive barrier, insulation board, metal lath, Diamond Wall base coat, and a finish coat.
- B. Application Methods: The Diamond Wall One-Coat Systems are applied directly to a structure at the construction site.

1.06 SUBMITTALS

- A. Product Data: All product data sheets and details that pertain to the project
- B. Samples: Submitted upon request:

1. Samples of the Diamond Wall One-Coat System shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project.
2. Retain approved samples at the construction site throughout the application process

1.07 QUALITY ASSURANCE

A. Qualifications:

1. System component materials shall be manufactured or approved by Omega Products International, Inc. and shall be distributed by the same or its authorized dealers.
2. Plastering Contractor:
 - a. Shall specialize in cement plasterwork with documented experience.
 - b. Shall provide proof of current contractor's license and bond where required.
 - c. Shall show proof of current approved applicator certificate issued by Omega Products International, Inc.

B. On-Site Mock-Ups: Produced upon request

1. Prior to commencement of work, provide a mock-up for approval
 - a. Mock-up suitable to represent the products to be installed and each color and texture constructed using the same tools and techniques to be utilized on the project.
 - b. Retain approved mock-up at job site throughout the application process.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials to the construction site in their original, unopened packaging with labels intact.
- B. Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.
- C. Storage temperatures should generally be between 40°F and 100°F

1.09 PROJECT CONDITIONS

A. Environmental Requirements:

1. Before, during and following the application of the Diamond Wall One-Coat System, the ambient and surface temperatures must remain between 40°F and 120°F for a minimum period of 24 hours

- B. Existing Conditions:
 - 1. Access to electrical outlets, clean, potable water, and a suitable work area at the construction site throughout the application of the Diamond Wall One-Coat System

1.10 SEQUENCING AND SCHEDULING

- A. The installation of the Diamond Wall One-Coat System shall be coordinated with all other construction trades.
- B. Provide sufficient manpower to ensure continuous operation, free of cold joints, scaffolding lines, variations in texture, etc.

1.11 WARRANTY

- A. It is the responsibility of both the specifier and purchaser to determine if a product is suitable for their intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings and the like. Omega has prepared guidelines in the form of specifications, application details and product data sheets to facilitate the design process only. Omega is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Omega or otherwise, or for any changes which purchasers, specifiers, designers, or the appointed representatives may make to Omega's published documents.
- B. Upon the completion of the installation of the Diamond Wall One-Coat System Omega Products International, Inc. shall provide a standard limited warranty when requested in writing. Omega Products International, inc. shall make no other warranties, expressed or implied.

1.12 MAINTENANCE

- A. The following materials shall be presented to the owner following the application of the Diamond Wall One-Coat System:
 - 1. One container of finish for each color and texture utilized on the project.
 - 2. A maintenance program for finishes as required.

PART II: PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Omega Products International, Inc.

2.02 COMPONENTS

- A. Weather Resistive Barrier: Minimum grade D kraft building paper complying with UBC Standard 14-1, is required
- B. Insulation Board: Shall meet nominal density, length, width, and thickness as required in ICC ESR-1194
 - 1. Expanded Polystyrene Insulation Board (EPS)

- a. EPS board has a nominal density of 1.5 lbs per cubic foot, a class I flame-spread classification and a smoke developed rating not exceeding 450 and must comply with ASTM C 578-95, as Type II boards. Boards installed without sheathing over open framing are 1 inch thick and are provided with 3/8 inch high tongues with compatible grooves with horizontal joints. All boards must be recognized in a current evaluation report issued by ICC ES

C. Lath

1. Metal Lath

- a. Complies with Table 25-B of the 1997 Uniform Building Code (UBC). Furring and self-furring requirements are as set forth for Wire fabric lath.

2. Woven-Wire Mesh

- a. Minimum No. 20 gauge, 1 inch galvanized steel, woven-wire fabric. Lath must be self furring or furred when applied over all substrates except unbacked polystyrene board. Self-furring lath for coatings must comply with the following requirement: The maximum total coating thickness is 1/2"
- b. Furring crimps must be provided at maximum 6 inch intervals each way. The crimps must fur the body of the lath 1/8 inch, minimum, from the substrate after installation.

D. Sand

1. Sand must be clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter
2. Sampling and testing must comply with ASTM C 144 or C 897
3. Sand must be graded in accordance with ASTM C 144 or C 987 or within the following limits:

RETAINED ON U.S. STANDARD SIEVE	PERCENT RETAINED BY WEIGHT +/- 2 PERCENT	
	MIN.	MAX
No. 4		0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100

E. Accessories

1. Corner Mesh: Formed Steel, minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; galvanized finish

2. Strip Mesh: Metal Lath, 3.4 lb/yd² expanded metal, galvanized, 6 in. wide x 18 in. long
 3. Casing Bead: Formed steel; minimum 24-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges; galvanized finish
 4. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, of longest possible lengths; galvanized finish
 5. Control and Expansion Joints: depth to conform to plaster thickness, maximum practical lengths, with Unijoint II, galvanized finish
 6. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place
 7. Penetration Flashing: Type I, Grade A building paper conforming to UBC Standard 14-1, 9 in. wide x length required
 8. Wire: ASTM A 641, Class I coating (galvanized), soft temper
- F. Water: Clean and potable without foreign matter
- G. Base Coat
1. Diamond Wall concentrate manufactured by Omega Products International, Inc.
- H. Finish Coat
1. AkroFlex Finishes/OmegaFlex finishes manufactured by Omega Products International, Inc.

2.03 MIXES

- A. All material mixing and tinting instructions are contained in the appropriate Product Data Sheets written and published by Omega Products International, Inc.
- B. Protect base coat and finish coat from frost, contamination, and rapid evaporation
- C. As an alternate, the Diamond Wall PM system allows the substitution of the Omega Diamond Wall PM Admix 500, an admixture composed of acrylic polymers and modifiers, of approximately one half of the water requirement. The Admix 500 is packaged in 1-gallon (3.8L) bottles, 3 ½-gallon (13.25L) pails, or 5-gallon (18.9L) pails
- D. Refer to ICC ESR-1194 for additional requirements

PART III: EXECUTION

3.01 EXAMINATION

- A. Substrates
 - 1. Acceptable substrates must be securely fastened per applicable building code requirements
 - 2. Acceptable substrates and adjacent materials must be dry, clean, and sound. Substrate surface must be flat, free of ins or planar irregularities greater than 6 mm in 3m (1/4" in 10')
- B. Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick out flashing must be properly installed prior to application of Omega Diamond Wall One-Coat System
- C. Unsatisfactory conditions shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until all unsatisfactory conditions have been corrected

3.02 SURFACE PREPARATION

- A. Clean the substrate to which the Diamond Wall One-Coat System is to be applied, ensuring that there are no foreign materials present
 - 1. Foreign materials include, but are not limited to, oil, dirt, dust form release agents, efflorescence, paint, wax, water repellants, moisture, frost and or extended nails that may rupture the weather resistive barrier
- B. Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials

3.03 INSTALLATION

- A. Weather Resistive Barrier
 - 1. Application of the barrier must comply with Section 1402.1 of the UBC. When applied over any wood-based sheathing, the barrier must be a minimum of two layers of Grade D building paper as set forth in Section 2506.4 of the code
- B. Foam Plastic Insulation Boards
 - 1. Foam Insulation board is installed over the paper prior to lath and is attached using galvanized staples or roofing nails. Vertical butt joints must be staggered at least one stud space from adjacent courses, and must occur directly over studs, accept over solid backing
 - 2. Applicator must refer to ICC ESR-1194 for detailed instructions prior to application

C. Lath

1. Wire Fabric Lath

- a. Wire of lath shall be applied with minimum 25 mm (2 inch) end laps and side laps
- b. Furring crimps shall occur at maximum 152.4-mm (6 inch) intervals each way. Furring crimps shall provide a minimum 3.18-mm (1/8-inch) clearance from the substrate after installation
- c. When end laps occur between supports, lace or wire tie the ends of the sheets with 1.2-mm (0.0475") galvanized annealed steel wire
- d. Refer to ICC ESR-1194 for additional information

2. Metal Lath

- a. Diamond Wall is applied over metal lath complying with Table 25-B of the code in lieu of Wire Fabric Lath. Metal lath fastening must comply with Table 25-C of the UBC, except the fastener length must be increased by the thickness of any substrate.

D. Base Coat

1. Apply Omega Diamond Wall by either mechanical sprayer or hand application method to the correct thickness shown below:

- a. Over EPS using 1 inch x 20 gauge wire lath shall be a minimum of 3/8 inch thick or maximum 1/2" thick
- b. Leveling Coat over concrete or concrete block using no wire lath shall be a maximum of 1/2 inch thick (bonding agents such as Omega Bond Crete may be required)

2. Moist cure the diamond Wall base coat for a minimum of 24 hours under normal conditions. Extreme heat and/or wind will require additional moist curing. Under these conditions moist cure until sufficiently hard

3. Applicator must refer to ICC ESR-1194 for detailed instructions

E. Finish

1. Omega finish products shall be applied no sooner than 14 hours following the application of the base coat. Refer to the installation instructions on the appropriate finish data sheet

2. When applying acrylic based or highly moisture resistant finish coatings the applicator of such is responsible for insuring the fresh Diamond Wall application is properly hydrated and sufficiently hard

F. Tolerances

1. Maximum variation from true flatness: 1/4 inch in 10 feet

3.04 CLEANING

- A. Remove any and all materials used, overspray from surrounding materials, and all protective masking.

END OF SECTION

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SECTION 07430

COMPOSITE PANELS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes: Composite panels, including:
 - 1. High Performance Rout and Return Dry System with PE Core Alucobond®
- B. Related Sections: Section(s) related to this section include but are not limited to:
 - 1. Structural Framing: Division 5 Metals Section
 - 2. Flashing and Sheet Metal: Division 7 Flashing Section
 - 3. Sealants (not specified in this section): Division 7 Sealant Section
 - 4. Windows: Division 8 Window Section

1.02 SYSTEM DESCRIPTION

- A. Provide a watertight Rout and Return Dry panel system, as detailed on the drawings. The panel system must consist of a dry gasket interlocking system. Any panel system utilizing a continuous field applied joint sealant is unacceptable.
- B. The panel system as detailed, shall consist of concealed dry gasketed perimeter extrusions, extruded stiffeners, gaskets, fasteners and may consist of related flashings (where architectural drawings indicate they are to be furnished under this specification section), sealants between jamb panels and previously installed adjacent construction, and other miscellaneous accessories required for a complete watertight installation. Assembly shall be water and airtight without reliance on a secondary backup membrane.

1.03 SUBMITTALS

- A. Pre-bid submittals:
 - 1. Project Listings: Submit five (5) listings of projects of similar scope and character, photographs of existing installations. Include the contact names and phone numbers for the representatives of the Owner, Architect and Contractor for each of the projects.
 - 2. Substitutions: Any proposed system must comply with the *Substitution Section 1.04 B* and submit the following:

- a. **Prior to bid approval**, submit the following ten (10) days prior to the bid date:
 - (1) Sample: Panel system specifications and 24" x 24" sample fabricated showing the typical 4-way intersection, with perimeter extrusions and stiffeners. Samples must be accessible from the backside.
 - (2) Details: Details and installation instructions showing typical edge conditions, corners joints, terminations and 4-way intersections. Details must include sealing instructions.
 - (3) Test Reports: Independent laboratory test results certifying that the proposed panel system meets or exceeds **all** the tests required in this specification.
 - b. Submit the following with the bid after the substitution has been approved:
 - (1) All costs resulting from modifications to the structure, substrates and/or other components as required by the proposed substitution. Each and every cost shall be clearly delineated in the submittal.
- B. Post-bid submittals:
- 1. Shop Drawings: Submit CAD generated shop drawings showing profiles of panel units, details of forming, joint supports, anchorages, trim, flashings, sealants and accessories. Show details of weatherproofing at edge terminations, show elevations, and layout of entire work.
 - a. Shop drawings should indicate project layout from control grid lines and elevations referring to the required details for each unique condition.
 - b. The details should show the preferred profiles and performance requirements. Provide a watertight and structurally sound, self-draining wall panel system that meets or exceeds the performance criteria set in the *Testing Section 1.05*.
 - 2. Samples: Submit an 8" x 8" sample of panel system in the specified finish complete with factory applied edge treatment, fabricated into units representative of the actual system.
 - 3. Test Reports: Submit certified test reports which meet or exceed the requirements as described in the *Testing Section 1.05*. The test report shall include the following,
 - a. Name and location of the certified independent testing laboratory with the contact phone numbers.
 - b. Date the test was performed.

- c. Unit description and system name of the panel system tested. Include the test drawings with elevations with details showing the tested panel joinery.
- 4. Report of Approval: ICC/EC Evaluation Report No. ESR-1114.
- 5. Affidavit: Certifying material meets requirements specified.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer qualifications: Installer experienced in performing work of this section who has experience in wall applications similar to that required for this project.
 - a. Installation History: Installer shall be a firm that has at least five (5) years of experience with exterior wall applications and has successfully completed installations of similar scope and size to this project.
- 2. Fabricator Qualifications: Fabricator capable of providing field service representation during construction, approving acceptable installer and application method.
 - a. Fabrication History: Panel fabricator shall assume undivided responsibility for all components of the panel work, and shall demonstrate no less than ten (10) years successful experience of metal panel work similar in scope and size to this project.
- 3. Manufacturer Qualifications: Manufacturer experienced in performing work of this section that has experience with the specified materials.
 - a. Manufacturer of the composite material must have at least ten (10) years experience in the production of the specified composite material.
 - b. ICC/EC Report: Composite panel manufacturer shall have an ICC/EC Research Report (i.e., Report ESR-1114 for Alucobond PE Core[®]).
 - c. Certification: Composite panel manufacturer shall have established a Certification Program acceptable to the local Code Authorities.
 - d. Manufacturers of the accessories and perimeter framing extrusions must have at least five (5) years experience in the production of their respective products.

B. Substitutions: Any substitution must comply with the pre-bid submittal as discussed in the *Submittal section 1.03*. No post-bid substitutions are allowed.

- 1. Any proposed system shall be approved and compatible with adjacent materials and components such that the assembly as a whole will conform

to this specification, and shall include an extruded aluminum perimeter to provide the designed architectural reveal and guttering system without the use of external field applied sealants. Any substitution must also comply with the *System Description Section 1.02* and meet or exceed the performance requirements as described in the *Testing Section 1.05* without the reliance of a secondary backup membrane.

C. Code Performance Requirements: Work of the section shall conform to all applicable codes and regulations.

1. Thermal Design Criteria:

- a. Make allowances for free and noiseless vertical and horizontal thermal movement due to the contraction and expansion of component parts, for an ambient temperature range from -20 degrees F to +180 degrees F. Buckling of panels, separation/opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement of component parts will not be permitted. Fabrication, assembly and erection procedure shall take into account the ambient temperature range at the time of the respective operation.

2. Wind Loads:

- a. Assemblies herein specified shall be designed for flexural, shear and torsional stresses for the following positive and negative wind pressures acting normal to the plane of the assemblies. Loading design shall; be based on latest Building Code but in no case less than 20 pounds per square foot with 25 pounds per square foot corner pressure.

3. Material Stress and Deflection:

- a. Normal to the plane of the wall between structural supports, deflection of the attached perimeter-framing members shall not exceed $L/175$ of span length or $3/4"$, whichever is less. The deflection at the midpoint of the panel shall not exceed $L/60$.
- b. At connection points of framing members to anchors, anchor deflection in any direction shall not exceed $1/16"$. Where connection points are not clearly defined, maximum anchor deflection shall not exceed $1/16"$.
- c. Stresses must take into account interaction and in no case shall allowable values exceed the yield stress.
- d. At 1.5 times design pressure, permanent deflections of framing members must not exceed $L/1000$ of the span length, and components must not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed $1/16"$.

1.05 TESTING

- A. Wall System Test Specimen Arrangement: The panel system test specimen must be arranged with at least four (4) panels. The panel joint arrangement shall consist of intersecting typical vertical and horizontal joints to generate a typical 4-way intersection and include the design and materials for the 4-way splice. Testing a 3-way intersection alone is not acceptable.
- B. Wall System Performance: Walls furnished under this section shall have been tested. If comparable tests are not available, mockups shall be constructed and tests performed. In either case, an independent laboratory approved by the architect shall conduct the tests. Test results shall meet or exceed the following without reliance on a secondary backup membrane:
 - 1. Air Infiltration:
 - a. When tested in accordance with ASTM E283, the air infiltration at 6.24 psf must not exceed 0.06 cfm per square foot of wall area.
 - 2. Static Water Infiltration:
 - a. When tested at a differential static pressure of 15.0 psf for 15 minutes, in accordance with ASTM E331, any uncontrolled water passing into the room-side beyond the interior barrier of the wall system shall not be permitted. The panel system shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water occurring at joints and/or condensation taking place within the wall system.
 - 3. Dynamic Water Infiltration:
 - a. Shall be tested in accordance with AAMA 501 with a slipstream velocity, creating a pressure on the wall equivalent to 15.0 psf with a water spray rate of 5 gallons per hour per square foot for 15 minutes with no uncontrolled water leakage to the room-side.
 - 4. Structural Performance:
 - a. Shall be tested in accordance with ASTM E330 at design pressure. Deflection limitations are listed previously. After initial test, test at 150% of design pressure; no permanent deformation exceeding L/1000 or failure to structural members allowed.
 - 5. Seismic Racking:
 - a. There shall be no failure or deterioration of the system when the unit is laterally racked to 3/4" in both directions and repeated for three (3) cycles. System must pass the static water requirements as described in the *Static Water Infiltration Section 1.05 A 2*, following the seismic racking.

- C. Bond Integrity Test: In accordance with ASTM D 1781-76 for bond integrity, simulating resistance to delaminating (No other test procedure is acceptable):
 - 1. Peel strength: 22.5 in lb/in (min)
- D. Fire Performance:
 - 1. ASTM E84-79 - Maximum value flame spread 0, smoke developed 0
 - 2. UBC 17-5 - No flame spread along interior face or penetration through the wall assembly
 - 3. ASTM 162 - No surface flaming

1.06 PRODUCT HANDLING

- A. After acceptance of panels on a given elevation, protection shall be the responsibility of the General Contractor.

PART 2 - PRODUCTS

2.01 COMPOSITE PANEL SYSTEM

- A. Fabricator: ESC Alucobond® Architectural Wall System manufactured by Elward Systems Corporation of Lakewood, Colorado. (800) 933-5339 or (303) 239-6303.
- B. Panel System: The panel system shall consist of Alucobond® manufactured by Alcan Composites USA Inc., Benton, Kentucky, and a system of custom aluminum extrusions as specified herein. The panel shall conform to all of the following,
 - 1. Perimeter Extrusions: Extruded aluminum with integral weather-stripping as detailed on drawings, so as to provide the following essential features,
 - a. Rout and return the Alucobond® on all perimeters. "Continuous Edge Grip" (CEG) is not acceptable.
 - b. Exposed edge of the Alucobond® shall be protected inside an extruded aluminum pocket.
 - c. Maximum overall panel thickness, including the attachment shim space, shall not exceed 2".
 - d. The Alucobond® shall be mechanically attached to all perimeter extrusions. The mechanical fastener must not penetrate any portion of the outer (exterior) skin of the aluminum composite material. Attachment of the Alucobond® to the perimeter extrusions with structural silicone is not allowed.
 - e. Do not substitute sealants for dry gasketing shown at the metal panel joinery.

2. Stiffeners: Extruded aluminum sections secured to edge trim and bonded to rear face of Alucobond® with silicone, and of sufficient size and strength to maintain flatness of the panel within the specified tolerances.
3. Reveals at Panel: Joint size between the faces of the perimeter extrusions shall be 1/2", nominal.
4. Flatness Criteria: Maximum 1/8" in 15'-0" on panel in any direction for assembled units. (Non-accumulative)

2.02 MATERIALS

A. Alucobond® Composite Material (ACM or MCM):

1. Composite: Two sheets of aluminum sandwiching a core of extruded thermoplastic, formed in a continuous process with no glues or adhesives between dissimilar materials. Total composite thickness is 4mm.
2. Face Sheets: 0.020" thick
3. Color and Coating: Silver.
4. Finish: The selected coating must meet the weathering performance criteria of AAMA 2605. Exterior surfaces shall be coil coated Kynar 500® or Hylar 5000® based polyvinylidene fluoride (PVDF) resin. Other resin-based coatings are not acceptable. In particular, the coating must have successfully passed the following tests:
 - a. Humidity Resistance
 - (1) Test Method: ASTM D-2247
 - (a) No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degrees Fahrenheit for 4,000 hours.
 - b. Salt Spray Resistance
 - (1) Test Method: ASTM B-117; expose coating system to 4,000 hours, using 5% NaCl solution.
 - (a) Minimum rating of 7 on scribe or cut edges.
 - (b) Minimum blister rating of 8 within the test specimen field.
 - c. Weather Exposure
 - (1) Outdoor
 - (a) Ten (10) year exposure at 45 degree angle facing south Florida exposure.

- (b) Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.
 - (c) Maximum chalk rating of 8 inches accordance with ASTM D-659.
 - (d) No checking, crazing, adhesion loss.
 - 5. Core: Thermoplastics
- B. Aluminum Extrusions:
 - 1. Perimeter Extrusions
 - a. Alloy: AA-6063-T5
 - b. Color: Extrusion color shall be black painted Duracon.
 - 2. Stiffeners
 - a. Alloy: AA-6063-T5
 - b. Color: Stiffeners shall have a mill finish.
- C. System Sealants:
 - 1. Sealants and gaskets within the panel system shall be per manufacturer's standards.
 - 2. Sealant color shall be black.
- D. Gaskets:
 - 1. Gaskets shall be Santoprene or EPDM.
- E. Flashings:
 - 1. Fabricate flashing from 0.062" minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Provide lap strip under flashing at abutted conditions; with lapped surfaces sealed with a full-bed of non-hardening sealant.
- F. Fasteners:
 - 1. Attachment of the panel system to the primary panel structural supports shall be made using a Drill-Flex® Fastener by ELCO Textron Inc.
 - 2. Typical joinery shall be attached with concealed fasteners. When exposed fasteners are required in isolated conditions, the fastener shall be obscured in the panel joinery.

2.03 FABRICATION

- A. Fabricate panel units to dimensions indicated on the drawings based on an assumed design temperature of +70 degrees F. Allow for ambient temperature range at time of fabrication and erection.
- B. Fabricate panels in sizes shown using composite aluminum panel material and perimeter extrusion so that the panel thickness at the joinery is no more than 1.75". Completed panel shall be properly fabricated and designed so that no restraints are placed on the panel, which might result in excessive compressive skin stresses. The installation detailing shall be such that the installed panels shall remain flat due to temperature changes and at all times remain water and air-tight. Oil canning of panel surface is not acceptable.
- C. Where practical, shop fabricate units ready for erection. If not shop assembled, pre-fabricate components at the shop as required for proper and expeditious field assembly.
- D. Design, fabricate, assemble, and erect wall panel units, to insure a weather tight system, as required in this specification section.
- E. Where drawings indicate, factory curve panels to required radii. Extrusions shall be factory stretched formed to conform to panel curve.
- F. Provide stiffeners secured to rear face of panels mechanically fastened to edge trim members, with spacing as required by specific job wind loading.

PART 3 – EXECUTION

3.01 DELIVERY AND STORAGE

- A. Delivery: Deliver fabricated units and component parts identified per erection drawings.
- B. Protection of Surfaces: Protect surfaces from damage during shipping and erection. Inspect work for damage upon delivery - no damaged work permitted on job site.
- C. Storage: Coordinate with General Contractor for storage space.
- D. Panel Penetrations: Penetrations including those shown on the Architectural Drawings that are required by other trades shall be done by the trade involved, unless noted otherwise.

3.02 INSPECTION

- A. Examine supporting structure and conditions under which the work is to be erected, and notify the Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Install in compliance with manufacturer's product data, including shop drawings, installation instructions, technical bulletins, and special detailing pertaining to the any specific condition.
- B. Erect panel work in a square, plumb, strait, and true, accurately fitted manner.
- C. Do not install component parts, which are observed to be defective, including warped, bowed, dented, abraded and/or broken members.
- D. Do not cut, trim, weld, or braze component parts during erection, in a manner which would damage finish, decrease strength, or result in a visual imperfection or a failure in system performance. Return component parts that require alteration to shop for re-fabrication, if possible, or for replacement by new parts.
- E. Apply a coat of bituminous paint, concealed, on one or both surfaces wherever dissimilar metals would otherwise be in contact. Use gasketed or approved coated fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.
- F. Anchor panels securely in accordance with the approved shop drawings to allow for the necessary thermal movement and structural support as specified above.

3.04 CLEANING AND PROTECTION

- A. After installation of panels on a given elevation, any additional protection shall be the responsibility of the General Contractor.
- B. Deposit all trash from panel shipping crates in General Contractor's furnished debris boxes.
- C. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- D. Remove protective film at time of panel installation.

END OF SECTION

ADDITIONAL NOTES FOR SPECIFICATION WRITER

- 1) Other possible additions to this specification may include:
 - a) Window system that integrates with panel system having minimal exposed sealants between panel and window units (Contact Elward Systems Corporation).
- 2) If other panel systems must be named, contact ESC for comparable materials that can be integrated into the panel system and meet the quality assurance portion of this specification.
- 3) Contact ESC for specifications on these other ESC systems:
 - a) RRW138 system (A Rout & Return Wet System)
 - b) ESC systems utilizing Alucobond® Plus
 - c) ESC systems utilizing Reynobond or Apolic material
 - d) Custom ESC systems

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**SECTION 075419.05
MECHANICALLY-ATTACHED
THERMOPLASTIC MEMBRANE ROOFING**

PART 1 - GENERAL CONDITIONS**1.01 DESCRIPTION****A. Scope**

To install a mechanically-attached Sarnafil roofing membrane, or equal prior to bidding with flashings and other components to comprise a roofing system.

B. Related Work

The work includes but is not limited to the installation of:

1. Substrate Preparation
2. Roof Drains
3. Insulation
4. Separation Layers
5. Roof Membrane
6. Fasteners
7. Adhesive
8. Roof Membrane Flashings
9. Metal Flashings
10. Sealants

C. Upon successful completion of work the following warranties may be obtained:

1. Sarnafil Warranty
2. Roofing Contractor Warranty

1.02 QUALITY ASSURANCE**A. This roofing system shall be applied only by a Roofing Contractor authorized by Sarnafil prior to bid (Sarnafil "Applicator").****B. Upon completion of the installation and the delivery to Sarnafil by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and Sarnafil's requirements, an inspection shall be made by a Technical Representative of Sarnafil to review the installed roof system.****C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and Sarnafil.****D. All work pertaining to the installation of Sarnafil membrane and flashings shall only be completed by Applicator personnel trained and authorized by Sarnafil in those procedures.****1.03 SUBMITTALS**

At the time of bidding, the Applicator shall submit to the Owner (or Representative) the following:

A. Copies of Specification.**B. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.**

- C. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.
- D. Sample copy of Sarnafil's warranty.
- E. Sample copy of Applicator's warranty.
- F. Dimensioned shop drawings which shall include:
 - 1. Outline of roof with roof size and elevations shown.
 - 2. Profile details of flashing methods for penetrations.
 - 3. Technical acceptance from Sarnafil.
- G. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.
- H. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.
- I. Material Safety Data Sheets (MSDS)

1.04 CODE REQUIREMENTS

The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

- A. Factory Mutual Research Corporation (FM) - Norwood, MA
 - 1. Class (1-90)
- B. Underwriters Laboratories, Inc. - Northbrook, IL
 - 1. Class A assembly

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
- D. All adhesives shall be stored at temperatures between 40° F (5° C) and 80° F (27° C).
- E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- F. All materials which the owner's representative and/or Sarnafil determine to be damaged are to be removed from the job site and replaced at no cost to the owner.

1.06 JOB CONDITIONS

- A. Sarnafil materials may be installed under certain adverse weather conditions but only after consultation with Sarnafil, as installation time and system integrity may be affected.

- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
- G. The Applicator is cautioned that certain Sarnafil membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with Sarnafil membranes. The Applicator shall consult Sarnafil regarding compatibility, precautions and recommendations.
- H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Sarnafelt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
- I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- J. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- K. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.
- L. All new roofing waste material (i.e., scrap roof membrane, release paper, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.
- M. The Applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- N. Installation of a Sarnafil membrane over coal tar pitch or a resaturated roof requires special consideration to protect the Sarnafil membrane from volatile fumes and materials. Consult Sarnafil for precautions prior to bid.
- O. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.
- P. All rooftop contamination that is anticipated or that is occurring shall be reported to Sarnafil to determine the corrective steps to be taken.
- Q. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to Sarnafil) to the Owner's Representative for corrective action prior to the installation of the Sarnafil roof system.

- R. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction at the Owner's expense (letter copy to Sarnafil).
- S. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.
- T. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.
- U. The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to help verify condition of the deck/substrate and to confirm expected pullout values.
- V. The Sarnafil membrane shall not be installed under the following conditions without consulting Sarnafil's Technical Dept. for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
 - 3. The wall/deck intersection permits air entry into the wall flashing area.
- W. Precautions shall be taken when using Sarnacol adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.
- X. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

1.07 BIDDING REQUIREMENTS

A. Pre-Bid Meeting:

A pre-bid meeting shall be held with the Owner's Representative and involved trades to discuss all aspects of the project. The Applicator's field representative or roofing foreman for the work shall be in attendance. Procedures to avoid rooftop damage by other trades shall be determined.

1.08 WARRANTIES

A. Sarnafil Membrane Warranty

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil Membrane Warranty shall be issued.

B. Sarnafil Standard Warranty

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil Standard Warranty shall be issued.

C. Sarnafil System Warranty (only products purchased from Sarnafil are covered under System Warranty)

Upon successful completion of the work to Sarnafil's satisfaction and receipt of final payment, the Sarnafil System Warranty shall be issued.

D. Applicator/Roofing Contractor Warranty

The Applicator shall supply the Owner with a separate workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no

cost to the Owner. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to Sarnafil.

E. Owner Responsibility

Owner shall notify both Sarnafil and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The components of the Sarnafil Sarnafast mechanically-attached roof system are to be products of Sarnafil as indicated on the Detail Drawings and specified in the Contract Documents.
- B. Components to be used that are other than those supplied or manufactured by Sarnafil may be submitted for review and acceptance by Sarnafil. Sarnafil's acceptance of any other product is only for a determination of compatibility with Sarnafil products and not for inclusion in the Sarnafil warranty. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with Sarnafil products.

2.02 MEMBRANE

- A. Sarnafil® S327 polyester reinforced membrane with a lacquer coating.
- B. Membrane shall conform to ASTM D4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing," Classification: Type III.
- C. As Manufactured, membrane shall conform to the following physical properties:
1. Color to be White. (if other than Standard color)
 2. Thickness to be 60 mil. (if other than 48 mil)

<u>Parameters</u>	<u>ASTM Test Method</u>	<u>Minimum ASTM Requirement</u>	<u>Sarnafil Typical Physical Properties</u>
Reinforcing Material	-		Polyester
Overall Thickness, min., inches (mm)	D751	0.045 (1.14)	0.048 (1.20)
Breaking Strength, min., lbf/in. (KN/m)	D751	200 (35.0)	230 (40.0)
Elongation at Break, min.	D751	15%	20%
Seam strength*, min. (% of breaking strength)	D751	75	85
Retention of Properties After Heat Aging	D3045	-	-
Breaking Strength, min., (% of original)	D751	90	95
Elongation, min., (% of original)	D751	90	90
Tearing Strength, min., lbf (N)	D1004	45.0 (200)	50 (220)
Low Temperature Bend, -40°F (-40°C)	D2136	Pass	Pass
Accelerated Weathering Test (Xenson Arc)	D2565	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7 x magnification)	-	None	None
Linear Dimensional Change	D1204	0.5% max.	0.1%
Weight Change After Immersion in Water	D570	± 3.0% max.	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 14.7 ft-lbf (20 J)	D5635	Pass	Pass

* Failure occurs through membrane rupture not seam failure.

2.03 FLASHING MATERIALS**A. Wall/Curb Flashing****1. Sarnafil G410 Membrane**

A fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive. Consult Product Data Sheets for adhesive options and additional information.

2. Sarnafil G459 Membrane

An asphalt-resistant, fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive. Consult Product Data Sheet for adhesive rates and additional information.

3. Sarnafil S327 Membrane

A polyester reinforced membrane used for mechanically-attached flashings to approved substrate using Sarnadisc or Sarnabar. Consult Sarnafil Product Data Sheet for adhesive rates and additional information.

4. Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0m). Consult Product Data Sheet for additional information.

B. Perimeter Edge Flashing**1. Edge-Tite Flashing**

A prefabricated perimeter edge attachment and fascia assembly provided by Sarnafil. Edge-Tite is made from three distinct parts. The (base) rail is made of formed 0.050 inch (1.3 mm) thick, 5052-H32 mill-finish alloy aluminum in 12 foot (3.6 m) lengths, provided with predrilled fastening holes. The spring clips are 6 inches (152 mm) wide and made from 0.020 inch (0.5 mm) stainless steel. The snap-on fascia is made from 24 gauge (0.6 mm) G90 steel or from 0.040 inch (1.0 mm) aluminum in 12 foot (3.6 m) lengths. Edge-Tite is available in a variety of fascia widths. Color and fascia metal shall be _____. Consult Product Data Sheet for additional information.

2. Anchor-Tite® Flashing

A heavy-duty prefabricated perimeter edge attachment and fascia assembly provided by Sarnafil. Anchor-Tite is made of two distinct parts. The anchor bar is extruded 0.125 inch (3.0 mm) thick from 6063-T6 alloy aluminum in 12 foot (3.5 m) lengths, provided with predrilled fastening holes. Snap-on fascia covers are formed from either 24 gauge galvanized steel with Kynar® or 0.40 inch (10 mm) aluminum with Kynar®, anodized or mill finish. Anchor-Tite is available in a variety of fascia widths. Color and fascia metal type shall be _____.

3. Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0m). Consult Product Data Sheet for additional information.

4. Non-Typical Edge

Project-specific perimeter edge detail reviewed and accepted for one-time use by Sarnafil's Technical Department. Consult Regional Technical Manager prior to job start for review and consideration for acceptance.

C. Miscellaneous Flashing

1. Sarnaflash

A prefabricated expansion joint cover made from Sarnafil membrane. Sarnaflash is designed for securement to vertical or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4½ inches (25 mm to 114 mm) across. Available in 40 foot (12 m) rolls. Consult Product Data Sheet for additional information.

2. Sarnareglet

A heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Sarnareglet is produced from 6063-T5, 0.10 inch - 0.12 inch (2.5 mm - 3.0 mm) thick extruded aluminum. Sarnareglet has a 2¼ inch (57 mm) deep profile, and is provided in 10 foot (3 m) lengths. Use prefabricated Sarnareglet mitered inside and outside corners where walls intersect. Consult Product Data Sheet for additional information.

3. Sarnastack

A prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick Sarnafil G410 membrane. Available in five different sizes. Consult Product Data Sheet for sizes and additional information.

4. Sarnadrain-RAC

PVC-coated, heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Sarnadrain-RAC is made of 0.080 inch (2 mm) thick 6063 aluminum with a urethane seal installed at the end of the drainpipe. The large 14 inch x 14 inch (0.36 m x 0.36 m) drain strainer is also made of 0.080 inch (2 mm) thick aluminum stock. The flange dimensions of Sarnadrain-RAC are 18 inches x 18 inches (0.46 m x 0.46 m). Consult Product Data Sheet for sizes and additional information.

5. Sarnacircle-"S"

Circular 0.048 inch (48 mil/1.2 mm) thick S327 membrane patch welded over T-joints formed by overlapping thick membranes.

6. Sarnafiller

A urethane sealant used for pitch pocket topping. Sarnafiller is a two component sealant. Sarnafiller cures with excellent elasticity and adhesion to various surfaces. Consult Product Data Sheet for additional information.

7. Sarnacorners

Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Sarnaclad base flashings. Sarnacorners are available in 2 outside sizes (5 inch and 8-1/2 inch diameter/ 127 mm and 215mm) and 1 inside size. Consult Product Data Sheet for additional information.

8. Multi-Purpose Sealant

A proprietary sealant used at flashing terminations. Consult Product Data Sheet for additional information.

9. Sarnacol 2170 Adhesive

A solvent-based reactivating-type adhesive used to attach membrane to flashing substrate. Consult Product Data Sheets for additional information.

10. Sarnacol 2126

A water-based contact-type adhesive used to attach the membrane to the flashing substrate. Consult Product Data Sheets for additional information.

11. S327 Coverstrip

9 inch (0.23 m) wide precut flashing made from Sarnafil S327 polyester reinforced membrane. Used to coverstrip Sarnabar and Sarnadisc.

2.04 INSULATION/OVERLAYMENT/RECOVER BOARD

A. Sarnatherm Insulation

A rigid isocyanurate foam insulations with black mat facers. Sarnatherm is available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thickness. Consult Sarnafil Product Data Sheets for additional information.

B. DensDeck®

A siliconized gypsum, fire-tested hardboard with glass-mat facers. DensDeck is provided in a 4 ft x 8 ft (1.2 m x 2.4 m) board size and in thicknesses of 1/4, 1/2 inch and 5/8 inch (13 mm and 16 mm). Consult Sarnafil Product Data Sheet for size, thickness and additional information.

C. SarnabARRIER

A spun-bonded polyester fabric separation layer used to separate the membrane from unfaced extruded or expanded polystyrene. Consult Sarnafil Product Data Sheet for additional information.

2.05 ATTACHMENT COMPONENTS

A. Sarnaplate

Used with various Sarnafasteners to attach insulation boards to roof deck. Sarnaplate is a 3 inch (75 mm) square or round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Sarnafil Product Data Sheet for additional information.

B. Sarnaplate-HD/CD

Used with Sarnafastener-HD or Sarnafastener-CD10 to attach insulation boards to wood or concrete roof decks. Sarnaplate-HD/CD is a 3 inch (75 mm) round stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Sarnafil Product Data Sheet for additional information.

C. Sarnaplate-Preassembled

Combination of a 3 inch round plate and a #12 fastener used to attach insulation boards to steel or wood roof decks. Sarnaplate-Preassembled consists of a 3 inch (75 mm) round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating and Sarnafastener #12 with modified buttress thread. The fastener shank diameter is approximately 0.168 inch (4 mm) and the thread diameter is approximately 0.214 inch (5 mm). Consult Sarnafil Product Data Sheet for additional information.

D. Sarnabar

An FM-approved, heavy-duty, 14 gauge, galvanized or stainless, roll-formed steel bar used to attach membrane to the roof deck. The formed steel is pre-punched with holes every 1 inch (25mm) on center to allow various Sarnafastener spacing options. Consult Sarnafil Product Data Sheet for additional information.

E. Sarnafastener #12

A #12 corrosion-resistant fastener used with Sarnaplates to attach insulation boards to steel or wood roof decks. Sarnafastener #12 has a modified buttress thread, a shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Sarnafil Product Data Sheet for additional information.

F. Sarnafastener-CD10

A nail-in, corrosion-resistant fastener used with Sarnaplate-HD/CD or Sarnabar to attach insulation or membrane to normal-weight concrete roof deck. Sarnafastener-CD10 has a shank diameter of 0.215 inch (5.5mm), a split diameter of 0.265/0.275 inch (6.7/7.0 mm) and a flat head with a 0.435 inch (11mm) diameter. Consult Sarnafil Product Data Sheet for additional information.

G. Sarnafastener-HD

A #14 corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation boards or with Sarnadisc and Sarnabar to attach membrane to structural concrete or wood roof decks. Sarnafastener-HD has a shank diameter of 0.190 inch (4.8 mm), a thread diameter of 0.245 inch (6.2 mm) and a #3 Phillips drive head with a diameter of 0.435 inch (11 mm). Consult Sarnafil Product Data Sheet for additional information.

H. Sarnafastener-XP

A #15, heavy-duty, corrosion-resistant fastener used with Sarnaplate to attach insulation or Sarnadisc, Sarnadisc-XP and Sarnabar to attach Sarnafil S327 roof membrane to steel or wood roof decks. Sarnafastener-XP has a shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Sarnafil Product Data Sheet for additional information.

I. Sarnacord

A 5/32 inch (4 mm) diameter, red-colored, flexible thermoplastic extrusion that is welded to the top surface of the Sarnafil membrane and against the side of the Sarnabar, used to hold the membrane in position. Consult Sarnafil Product Data Sheet for additional information.

J. Sarnadisc

A high strength plate used with Sarnafasteners to attach Sarnafil S327 roof membrane directly to roof decks. Sarnadisc is a 20 gauge (0.9 mm), 2 inch (50 mm) diameter corrosion resistant steel plate. Consult Sarnafil Product Data Sheet for additional information.

K. Sarnadisc-XP

Sarnadisc-XP is a high strength, linear plate used with Sarnafastener-XP to attach Sarnafil S327 roof membrane to the steel or wood roof decks. Sarnadisc-XP is an 18 gauge (1.2 mm), 2 inch by 3¾ inch (50 mm x 95 mm) corrosion resistant steel plate. Consult Sarnafil Product Data Sheet for additional information.

L. Sarnafastener-NTB-1H

Sarnafastener-NTB-1H is a specially designed fastener used with a specially designed 3 inch (75 mm) plate to attach insulation boards to certain gypsum, cementitious wood fiber and lightweight concrete roof

decks. Sarnafastener-NTB-1H is a molded product made of fiberglass-filled nylon. Consult Sarnafil Product Data Sheet for additional information.

M. Sarnafastener-NTB-1H-WW

Sarnafastener-NTB-1H-WW is a specially designed fastener used with a specially designed 2 inch (50 mm) disc to attach Sarnafil S327 roof membrane to certain gypsum, cementitious wood fiber and lightweight concrete roof decks. Sarnafastener-NTB-1H-WW is a molded product made of fiberglass-filled nylon and locking wire barbs. Consult Sarnafil Product Data Sheet for additional information.

2.06 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape

A 2 inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

B. Sealing Tape Strip

Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and wind blown moisture entry.

C. Sarnamatic 641mc

220 volt, self-propelled, hot-air welding machine used to seal long lengths of Sarnafil membrane seams.

D. Perimat Welder

120 volt, self-propelled, hot-air welding machine used to seal long –lengths of Sarnafil membrane seams along perimeter details.

E. Sarnasolv

A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Sarnasolv is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled. Consult Product Data Sheet for additional information.

2.07 SEALANTS AND PITCH POCKET FILLERS

A. Sarnafil Multi-Purpose Sealant (for termination details).

B. Sarnafiller (two-part urethane filler for pitch pocket toppings).

C. Depending on substrates, the following sealants are options for temporary overnight tie-ins:

1. Type III hot asphalt conforming to ASTM D312 (latest revision).
2. Sarnafiller.
3. Multiple layers of roofing cement and felt.
4. Spray-applied, water-resistant urethane foam.
5. Mechanical attachment with rigid bars and compressed sealant.

2.08 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic

corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION CONFERENCE

- A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.
- B. The meeting shall discuss all aspects of the project including but not limited to:
 - 1. Safety
 - 2. Set up
 - 3. Construction schedule
 - 4. Contract conditions
 - 5. Coordination of the work

3.02 SUBSTRATE CONDITION

- A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.
- B. Applicator shall verify that the work done under related sections meets the following conditions:
 - 1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
 - 2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
 - 3. All surfaces are smooth and free of dirt, debris and incompatible materials.
 - 4. All roof surfaces shall be free of water, ice and snow.

3.03 SUBSTRATE PREPARATION

The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner as to eliminate risk of deck overload due to concentrated weight. The Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location.

- A. New Construction
 - 1. Steel Deck:
 - a) FM approved steel deck - The roof deck shall be 22 gauge (minimum) grade E and shall conform and be installed to meet the latest revision of FM's Loss Prevention Data Sheet 1-28 and the local code's current requirements.
 - b) Non-FM approved steel deck - The roof deck shall be 24 gauge (minimum) grade D and shall conform and be installed to the local code's current requirements.

3.04 SUBSTRATE INSPECTION

- A. A dry, clean and smooth substrate shall be prepared to receive the Sarnafil Sarnafast mechanically-attached roof system.
- B. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.
- C. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.
- D. All roof surfaces shall be free of water, ice and snow.
- E. Sarnafil shall be applied over compatible and accepted substrates only.

3.05 WOOD NAILER INSTALLATION

- A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.
- B. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.
- C. Thickness shall be as required to match substrate and/or insulation height to allow a smooth transition.
- D. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

3.06 INSULATION INSTALLATION

General Criteria:

- A. Insulation shall be installed according to insulation manufacturer's instructions.
- B. Insulation shall be neatly cut to fit around penetrations and projections.
- C. Install tapered insulation in accordance with insulation manufacturer's shop drawings.
- D. Install tapered insulation around drains creating a drain sump.
- E. Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.
- F. Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.
- G. Mechanical Attachment
 - 1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's, FM's and Sarnafil's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

2. Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer and Sarnafil.
3. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

3.07 SEPARATION LAYER INSTALLATION

Approved separation layer shall be installed directly over expanded or extruded polystyrene (unless supplied with a approved, compatible facer). Unfaced polystyrene is incompatible with Sarnafil membranes without a separation layer.

A. General Criteria

1. Separation layer shall be installed according to Sarnafil's instructions.
2. Separation layer shall be neatly cut to fit around penetrations and projections.
3. Do not install more separation layer than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.
4. Mechanical Attachment:
 - a) Separation layer shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to Sarnafil's recommendations for fastening rates and patterns.
 - b) Fasteners are to be installed in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by fastener manufacturer and Sarnafil.
 - c) Overlap separation layer edges 4 inches (100 mm) and fasten through the overlaps at 24 inches (0.6 m) on center using Sarnafasteners and Sarnaplates to hold in position. The installation of the separation layer is to be followed immediately by the installation of the S327 membrane.

3.08 INSTALLATION OF SARNAFIL MEMBRANE

- A. The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

B. General

1. Sarnafil S327 membrane is to be attached with Sarnafasteners and Sarnabar according to Sarnafil's and Factory Mutual's requirements.
2. Membrane overlaps shall be shingled with the flow of water where possible.
3. Sarnafil full-width (78-5/8 inch or 2 meter) rolls shall be fastened perpendicular to the direction of the steel deck flutes, wood plank, precast or cementitious wood fiber panel where possible.
4. **Tack welding of S327 full or half-width rolls for purposes of temporary restraint during installation is not permitted.** Consult Sarnafil's Technical Department for further information.

C. Perimeter and Corner Areas

1. Over the properly installed and prepared substrate surface, S327 half-width (39 inches or 1 meter) rolls are to be installed with the entire perimeter edge. The number of adjacent half-rolls will be determined by building height and width and other conditions according to FM guidelines and Sarnafil Technical. Sarnafasteners and Sarnadiscs are installed along the edge of the membrane on the fastening line at a spacing determined by Sarnafil and the Owner's Representative/Designer. Sarnadisc are held-back 1 inch (25 mm) from the outer edge of the membrane. The adjacent half-roll is positioned to overlap the fastened edge of the first half-roll by 5-1/2 inches (140 mm) in accordance with the overlap lines marked on it's edge. The 5-1/2 inch (140 mm) overlap will allow the top membrane to extend 2-1/2 inches (63 mm) past the Sarnadisc for heat-welding. Fasteners shall clamp the S327 membrane tightly to the substrate. In corner areas where perimeter half-rolls intersect, add rows of Sarnafasteners and Sarnadiscs over the top the half-rolls and weld a (S327) coverstrip above them for watertightness. See Detail Drawings.

Notes:

- a) Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary being treated as a perimeter. Typically, internal expansion joints and firewalls are not considered to be full perimeters. Refer to Factory Mutual's Data Sheet 1-28 for more information.
- b) The ridge area is defined as the high point in the roof area formed by two intersecting planes. When the sum of the slopes is a minimum of 4 inches in 12 inches (30 degrees), each side of the ridge shall be treated as a perimeter area.

2. **Hot-air weld overlaps according to Sarnafil's requirements. Take test cuts at least 3 times per day.**

D. Interior Area

1. Over the properly installed and prepared substrate surface, S327 full-width (78-5/8 inches or 2 meters) rolls are to be installed parallel to the steel deck flutes, wood plank or wood or concrete panels. Sarnafasteners and Sarnadiscs are installed along the edge of the membrane on the fastening line at a spacing determined by Sarnafil and the Owner's Representative/Designer. Sarnadisc are held-back 1 inch (25 mm), from the outer edge of the membrane. The adjacent full-roll is positioned to overlap the fastened edge of the first full-roll by 5-1/2 inches (140 mm) in accordance with the overlap lines marked on it's edge. The 5-1/2 inch (140 mm) overlap will allow the top membrane to extend 2-1/2 inches (63 mm) past the Sarnadiscs for heat-welding. Fasteners shall clamp the S327 membrane tightly to the substrate. See Detail Drawings.
2. **Hot-air weld overlaps according to Sarnafil's recommendations. Take test cuts at least 3 times per day.**

E. Securement Around Perimeter and Rooftop Penetrations

1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, Sarnafasteners and Sarnadiscs shall be installed according to perimeter rate of attachment. Fasteners shall be installed according to the manufacturer's instructions. Fasteners shall be installed using the fastener manufacturer's recommended torque-sensitive fastening tools with depth locators. Fasteners shall clamp the Sarnafil membrane tightly to the substrate.
2. Sarnafil membrane flashings shall extend 2-1/2 inches (63 mm) past the Sarnadisc and be hot-air welded to the Sarnafil deck membrane.

3.09 HOT-AIR WELDING OF SEAM OVERLAPS

A. General

1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
2. Welding equipment shall be provided by or approved by Sarnafil. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Sarnafil Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry.

B. Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of Sarnafil's automatic welding equipment. When using this equipment, Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Sarnafil's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.10 MEMBRANE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

A. Sarnacol Adhesive for Membrane Flashings

1. Over the properly installed and prepared flashing substrate, Sarnacol adhesive shall be applied according to instructions found on the Product Data Sheet. The Sarnacol adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

B. Install Sarnadiscs according to the Detail Drawings with approved Sarnafasteners into the structural deck at the base of parapets, walls and curbs. Sarnadiscs may be required by Sarnafil at the base of all tapered edge strips and at transitions, peaks, and valleys according to Sarnafil's details.

C. Sarnafil's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by Sarnafil prior to installation.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Sarnafil Technical Department.

- E. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the Sarnafil membrane.
- F. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop at 6-8 inches (0.15-0.20 m) on center.
- G. Sarnafil flashings shall be terminated according to Sarnafil recommended details.
- H. All adhered flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Sarnafil Technical Department for securement methods.
- I. All mechanically-attached flashings that exceed 18 inches (0.46 m) in height shall receive additional securement. Consult Sarnafil Technical Department for securement methods.

3.11 SARNACLAD METAL BASE FLASHINGS/EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

- A. Sarnaclad metal flashings shall be formed and installed per the Detail Drawings.
 - 1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).
 - 2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
- B. Adjacent sheets of Sarnaclad shall be spaced ¼ inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4 inch minimum (100 mm) wide strip of Sarnafil flashing membrane shall be hot-air welded over the joint. Exercise caution at perimeter of roof.

3.12 METAL FLASHINGS

- A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
 - 1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
 - 2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.
- B. Metal, other than that provided by Sarnafil, is not covered under the Sarnafil warranty.
- C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.
- D. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.
- E. Metal joints shall be watertight.
- F. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

- G. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.
- H. Counter flashings shall overlap base flashings at least 4 inches (100 mm).
- I. Hook strips shall extend past wood nailers over wall surfaces by 1-½ inch (38 mm) minimum and shall be securely sealed from air entry.

3.13 EDGE-TITE METAL

- A. Position the Sarnafil membrane over the roof edge and down outside face of wall covering wood nailer(s) completely. Allow ½ inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.
- B. Apply a 3/8 inch (10 mm) bead of Sarnafil sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).
- C. Fasten base rail into the side of the nailer 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Edge-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.
- D. Position spring clips at 6 foot (1.8 m) centers on base rail. Locate spring clips at fascia cover laps and at mid-span of fascia cover.
- E. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.14 ANCHOR-TITE METAL

- A. Position the Sarnafil membrane over the roof edge and down outside face of wall covering wood nailer(s) completely, allowing ½ inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.
- B. Apply a 3/8 inch (10 mm) bead of Sarnafil sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).
- C. Fasten base rail into the side of the nailer at 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Anchor-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.
- D. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.15 COMPLETION

Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sarnafil prior to demobilization.

All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

3.18 DETAILS

See accompanying Sarnafil Detail Drawings.

Sarnafil has attempted to obtain information from the manufacturers of other products often used in conjunction with Sarnafil products with respect to the characteristics of such products, as well as their compatibility with Sarnafil's products. In as much as these other products as supplied in the field are subject to possible variation in their productions, and in as much as their specifications and performance characteristics are subject to change without notification by the manufacturers, Sarnafil expressly excludes from its warranty and responsibility for the performance or quality of the products of others used in conjunction with Sarnafil products. Sarnafil provides this specification as a guide only in technical support to architects or roof designers/specifiers. Sarnafil assumes no liability for error in design of or for misuse of this guide specification. The roof designer, engineer, architect or contractor must verify suitability of the specification and details.